MODEL AIRPLANE NEWS

7th Year of Publication

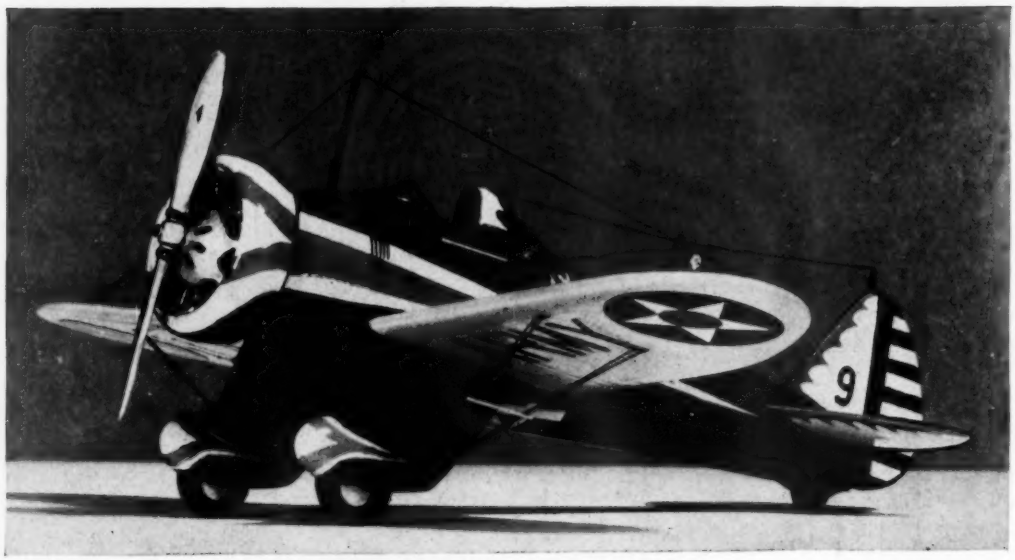
DECEMBER
1935
20c
Canada 25c

"Mister" Mulligan
Bendix Trophy Winner

THE GREATEST NAME IN MODEL AVIATION

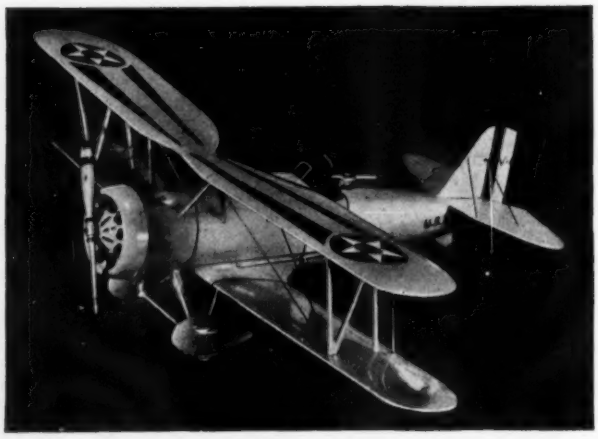
HAWK!!

JUST ONE OF FORTY

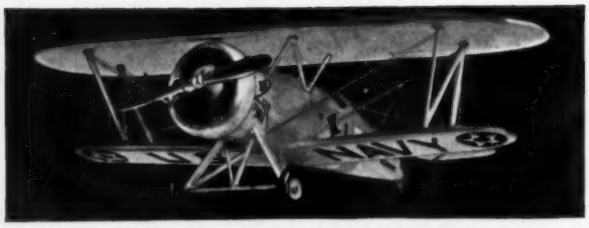


EASY TO BUILD KITS

BOEING P-26A (re-designed)



VOUGHT V-65



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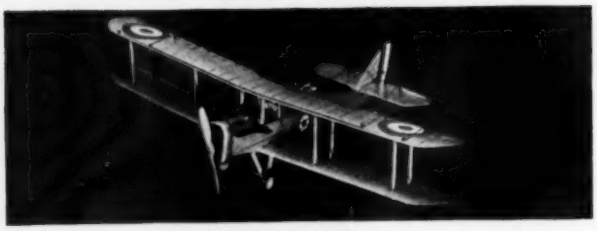

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Each Hawk Kit contains all wood parts, as fuselage, wings, stabilizer, and rudder, CUT TO OUTLINE SHAPE. Die cast machine guns, propellers and wheels are furnished in each kit. Kits requiring radial motors have die cast motors included. All sets have formed metal seats, good paint, glue, insignia and real scale plans. PROOF of this can be seen in these pictures.

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Boeing P.26A.	Hawk P-6-E	Autogiro
Boeing F. 4. B-4	Boeing P12-F	Spad 13
Bristol Fighter F-2B.	Monocoupe 90A.	B/J P. 16
B/J, OJ2, Seaplane	Vought 65	Sopwith Camel
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See Page 37

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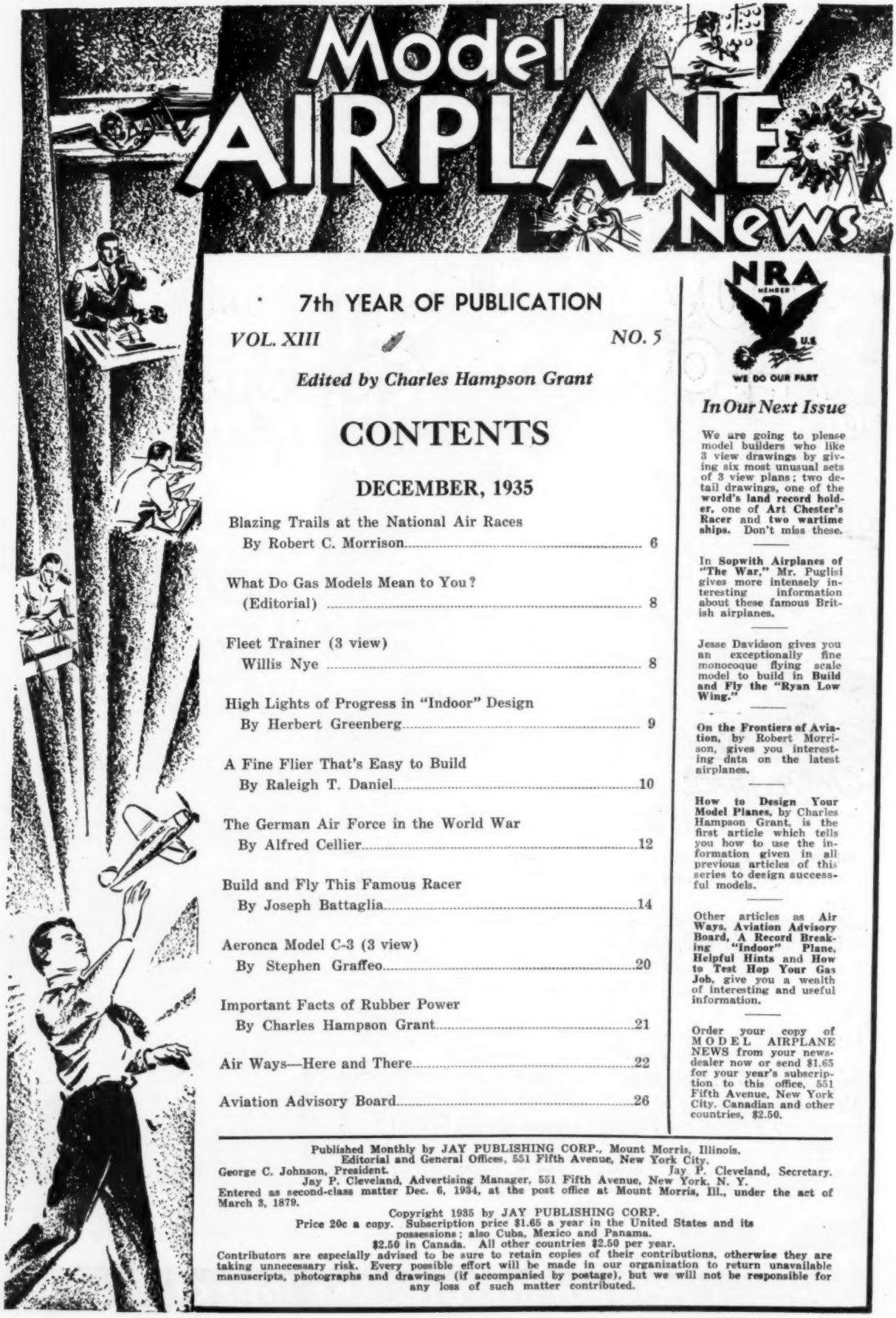

7th YEAR OF PUBLICATION

VOL. XIII *NO. 5*

Edited by Charles Hampson Grant

CONTENTS

DECEMBER, 1935

In Our Next Issue

We are going to please model builders who like 3 view drawings by giving six most unusual sets of 3 view plans; two detail drawings, one of the **world's land record holder**, one of **Art Chester's Racer** and **two wartime ships.** Don't miss these.

In **Sopwith Airplanes of "The War,"** Mr. Puglisi gives more intensely interesting information about these famous British airplanes.

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On the Frontiers of Aviation, by Robert Morrison, gives you interesting data on the latest airplanes.

How to Design Your Model Planes, by Charles Hampson Grant, is the first article which tells you how to use the information given in all previous articles of this series to design successful models.

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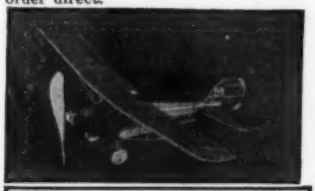
National's fleet of models has attained a reputation all over the United States and to the far corners of the earth. And now with National's new Policy, even greater world-wide enthusiasm is already evidenced. The precision scaling to ¼", ½", ¾", and 1", is the answer to the exacting demands of model builders who wanted something more than just another model. Experience new enjoyment with National's accurately detailed models—a complete line (solid and flying scale models) selling from 25c to $5.00. See them at your dealer or order direct.



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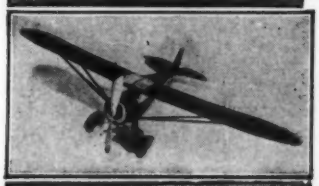

MONOCOUPE

New ½" scale Model. Span 18". Lgth. 10.16". Wgt. ¾ oz. Colors: red, black trim. Realistic and a thrill to fly. Complete Kit..... **25c**
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Also in this group at 25c each, plus P. P. 10c, Corbin Ace, Curtiss Robin, Heath Parasol, Fokker D-8, Puss Moth.

FAIRCHILD 22-C7-F

One of the most popular of all Fairchild planes. A snappy ½" scale model with orange fuselage and wings, green and silver trim. National features include adjustable elevators and rudder, motor tube, etc. Wingspan 16.5", Lgth. 12⅛", Wgt. ¾ oz. Complete Kit..... **$1.00**
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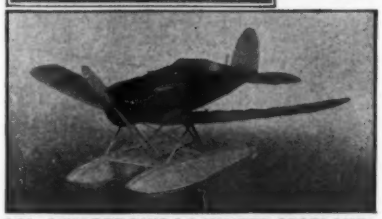
BOEING P-12-E

Like its prototype, the model is a beauty and an excellent flier. Colors: olive drab and yellow. Insignia. Wingspan 18", Lgth. 10.75", Wgt. 2 oz. Complete Kit..... **$1.00**
Plus P. P..... .15
Also in this group at $1.00 each plus P. P. 15c, Boeing F-4-B-3, British Supermarine, Curtiss A-B, Curtiss Condor.



COL. LINDBERGH'S LOCKHEED SEAPLANE

Authentically detailed model of this famous plane, a thrill to every model builder. Exact ½" scale. Wingspan 21.5", Lgth. 15.5", Wgt. 2 oz. Colors: black and orange, silver pontoons. Full size 3 view plan, safety motor tube, two props, adjustable controls, etc. Complete Kit..... **$2.00**
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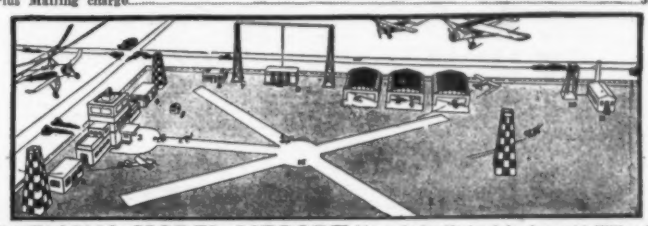

NATIONAL MODEL AIRPORT (An exclusive National development.) Will make you feel right in the atmosphere of one of the great airports of the country. Kit features ten buildings, three pylons and radio towers. A large ground plan 44" x 62" with soft green background, runways, aprons and location of buildings marked out, a fleet of modern tiny replica planes, full size detailed plan with instructions. The wood for each unit is cut to correct thickness, all details neatly printed out. Glazing for all openings, an assortment of brilliantly colored lacquers and cement to build this complete colorful airport. The only tools needed are a sharp knife and paint brush. Complete Kit..... **$5.00**
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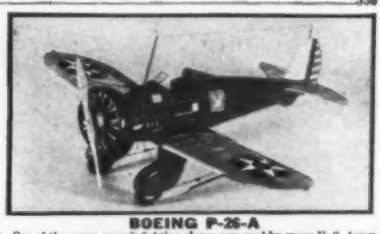
This group also includes 1932 Gee Bee, Rickenbacker's Spad, Nieuport Scout, Laird 400 and Texaco 13.

CURTISS HAWK P-6-E

A ½" de luxe solid scale model authentically detailed. Exhaust parts, gun troughs, Belly Tank, instrument board, windshield, movable control surfaces, insignia. Colors: olive drab and yellow. Wingspan 15.625", Lgth. 11.25". Complete Kit..... **50c**
Plus P. P.....10c
Also, ½" Boeing P-26-A, Fokker D-7. Each equally detailed.



BOEING P-26-A

One of the newer pursuit fighting planes now used by many U. S. Army squadrons. This faithfully detailed ½" scale model boasts every minute detail of the original ship: authentic louvres, exhaust pipes, navigation lights, built up detailed motor, etc. Colors: olive drab and yellow. The Wingspan 21", Lgth. 17.625", Wgt. 2⅞ oz. Complete Kit..... **$2.00**
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CURTISS ARMY HAWK

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A famous war-time plane. This newly redesigned ½" scale model is accurately detailed including its spandau guns. And what a flier! Wingspan 21.5", Lgth. 11.125", Wgt. 2¼ oz. Complete Kit..... **$1.75**
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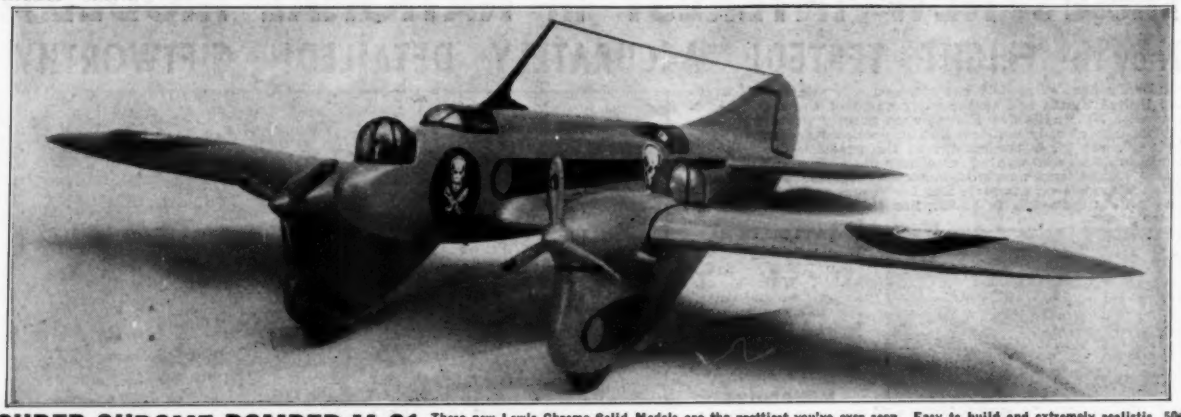

SUPER CHROME BOMBER M-21

These new Lewis Chrome Solid Models are the prettiest you've ever seen. Easy to build and extremely realistic. 50c per Kit plus 25c postage (except the Super Chrome Bomber which is $1.00 plus 15c postage). All four Chrome Models only $2.00 plus 25c postage. Order the complete set today.

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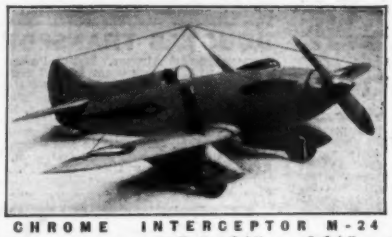

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Contain all cut to shape wood parts, finished cast prop., rubber tired wheels with cast hub, sandpaper, insignia, detailed plan, straightened steel flying wires, celluloid, turned cow (where needed), brush, wood filler, fillet compound, 4 bottles lacquer, balsa motor, cement, aluminum tubing for exhausts, sight and guns, radiator screening cockpit tubing, and special instruction sheet.

15-3/4"	Hawk P6-E	15-3/4"	Curtiss Goshawk
15"	Boeing F4B-4	14-1/2"	Northrop Fighter FT-1
14"	Boeing P26A	14"	Grumman Fighter F2F-1
15"	Boeing P12-E	15-1/2"	Waco D. Pursuit
13"	Boeing P29	15"	Hawker S. Fury

$1 ea. plus 15c postage

1/4" Scale Kits

contain cut to shape wood parts (body, wings, tail, etc.), pine struts, cast prop-pilots—guns and individual motors where needed, rubber tired wheels, detailed plan, straightened steel flying wires, sandpaper, insignia, celluloid, cement, wood filler, colored lacquers, finished balsa cowl where needed, radiator screen, exhaust tubing, special cockpit tubing, special high gloss clear liquid, and special instruction sheet.

5"	Macon Fighter	7-1/2"	Boeing F4B-4
5"	Vickers Jockey	6-3/4"	Boeing P29
7-3/4"	Waco D. Pursuit	7-3/4"	Berlin, Joyce P-85
7-1/2"	Hawker S. Fury	7-7/8"	Hawk P6-E
9-3/8"	Curtiss Falcon	7-1/4"	Northrop Fighter
9-1/4"	Consolidated	11-1/4"	Douglas Y-10-43
9-1/2"	Grumman 2-place	8"	Chrome Fighter M-22
7"	Grumman 1-place	8"	Chrome Pursuit M-23
7-7/8"	Curtiss Goshawk	8"	Chrome Interceptor
6-3/4"	Boeing P26A	16-1/2"	Chrome Bomber M-21

50c ea. Plus 5c postage, except Bomber which is $1.00 plus 15c postage. Any 4 except Bomber, $1.50 plus 15c postage.

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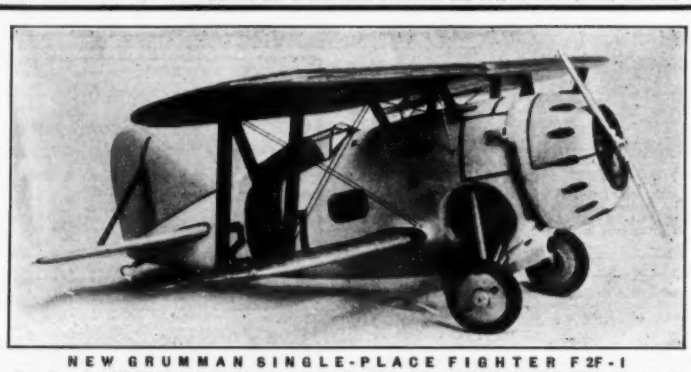
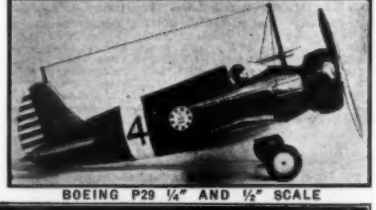


NEW GRUMMAN SINGLE-PLACE FIGHTER F2F-1

Here is a beautiful model of the Navy's newest—the 240 m.p.h. GRUMMAN FIGHTER. Already in use among many squadrons. Be sure to build it.

BOEING P26A 1/4" AND 1/2" SCALE



BOEING P29 1/4" AND 1/2" SCALE

WACO D PURSUIT

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CURTISS GOSHAWK F11C2

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FOR months engineers, backed by world-famous Aircraft Industries, Inc., have been working secretly on a Model Rotary-Valve Gasoline Engine that would be the finest in the world.

Now it is ready for you—the lightest, fastest, most economical engine for its size yet developed. Experts hail it as the last word in a model gasoline power plant for both airplanes and motor boats. The Baby Cyclone has ample power to fly a 6-pound model, yet planes weighing only 2 pounds complete can be built around the engine.

Now You Can Break Records!

Every detail of this marvelous little engine has been carefully worked out by our engineers who have had at their disposal all the resources and technical engineering data of this important aircraft corporation. Hundreds of hours of flight and block testing have taken every "bug" out of it. This means that every model builder who has flown a rubber-powered ship now can enjoy at small cost the thrill only a gasoline driven airplane can give. Now you can break records, too!

Has Won Every Competition

The Baby Cyclone Engine is the most sensational development to date. Every competition so far entered has been won hands down. Our Engines hold the California record of 1 hour and 3 minutes, and have won every California State Meet at Sacramento entered to date.

Specifications

The outstanding superiority of the Baby Cyclone is evident in its construction as well as its performance. Read the specifications carefully.

TYPE—1/6 H. P. Rotary valve 2 cycle 3/4" bore, 13/16" stroke giving 25% more power and fuel economy than standard 4 port, 2 cycle engines.

SPEED—Variable from 500 to 4000 r.p.m. with 13½" propeller. Idles down until it just ticks over. Needle valve controls speed. 1¾ oz. capacity light weight gas tank. Constant feed in steep climbs. Exhaust manifold permits perfect cowling of engine.

ELECTRICAL SYSTEM—Special A-C pointed plug. Finest coil yet developed, weight 2 oz. Specially designed timer for absolute reliability.

MATERIAL—Cylinder and piston special electro-furnace alloy iron, ground and lapped to .0003-inch; duralumin head; nickel steel rifle drilled crank shaft combining positive rotary valve. All other parts are accurate die castings, 20 times stronger than aluminum.

ENGINE OVERALL DIMENSIONS—3¼" deep x 1¾" wide (without ex. manifold) x 4¼" high.

WEIGHT—Complete 15 ounces with 2 standard flashlight cells.

PRICE—$15.75 complete as illustrated. Prepaid anywhere in U. S., mounted on wooden base after thorough inspection and actual run-in test at factory.

KITS—Complete kits for airplanes, designed for this engine, including the 1935 California State Championship Model, are available.

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"Mr." Mulligan DGA-6, winner of the Bendix Trophy Race

Turner's Wedell-Williams which caught fire

Blazing Trails at the National Air Races

In Which the Author Gives You Details of Who Was Who and What Was What at the 1935 Cleveland Air Races

By ROBERT MORRISON

EACH year Cliff and Phil Henderson put on an unparalleled air show called the National Air Races. It is an offspring of the Pulitzer Trophy Races, but it has taken on greater proportions than its "old man"—a sort of winged version of Barnum's good old circus. Everything is in the show but some good sound reasoning, so everyone who attends has a hilarious time. It is similar to the old Gates Flying Circus once headed by the late Ivor Gates and the popular Clyde Pangborn. This circus went from city to city with its wing walkers, parachute jumpers and its crate-like airplanes, but somehow the National Air Races have been stuck at Cleveland Airport for the last few years and only function for four days out of each year—a godsend to those who participate.

This year the Henderson circus tents were opened in a curtain of fog and rain and floated through four full days of thrills, crazy notions and a large financial profit. August 30th, 1935, was its official opening date, its fifteenth annual opening. Practically everyone of notoriety was on hand and they were certainly kept busy hopping mud puddles. Unfortunately, Premier Mussolini was not represented as he had some muscling to do in Ethiopia. However, Hitler sent Gerd Achgelis and his airplane over to give us an idea of the nonsensical flying that is done in Germany. Man could that boy stunt!

France sent their famous Michel De Troyat. Though he made everyone misunderstand him in his own inimitable way (he could speak only French), he put on a wonderful exhibit of flying, rivaled in America only by Al Williams and Milo "Upside Down" Burcham.

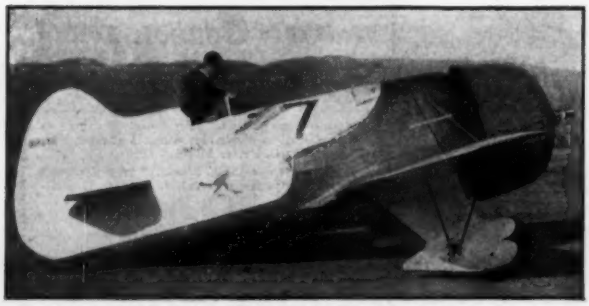
I left for Cleveland a few days in advance so as to get a real eyeful of what takes place during the days preceding the premier air classic. Hopping aboard one of United Airline's luxury Boeing airliners at the Newark Airport I was on my way towards Cleveland's airport. The entire trip took only three hours with superb comfort the whole way.

After a good night's rest in Cleveland, I began an early morning tour of the huge field. In one hangar, probably the smallest in the long row of hangars, were all the racers and mechanics jammed in as tightly as bees in a beehive and just about as busy. The last-minute touches were being put on the swift little racers. All were hoping to capture the large cash prizes that were to be offered in the four days to follow. Mechanics were seen scurrying hither and yon, heads kept bobbing in and out of cockpits, and the usual "scram" directed at those who had no business in the hangar was frequently heard.

The plane that caught my eye immediately was the huge Delgado Trades School racer doggedly holding its own as the trades school students climbed about it fixing what had not already been fixed. The ship resembled a huge June bug after climbing out of a pail of red paint. Unfortunately, though clean in design as it was, its cooling system kept the craft out of the races. After a short hop its engine would heat up so that white smoke belched forth in astounding volume. It laid a better smoke screen than the Marines' Voughts did at the Races last year. At the completion of its first test flight all activity had to be stopped in the hangar until the smoke was blown out and the workers' sight restored. The odor from the overheated engine was enough to force the moths out of Gordon Israel's wrecked racer that was stored in the rear of the hangar, a victim of a deep rut in the field which the plane's wheels were unable to surmount.

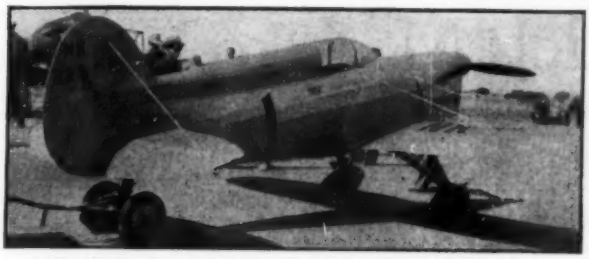
All the planes seemed to be in very much better condition than last year. First of importance were the Bendix racers. Roscoe Turner's tan-colored veteran Wedell-Williams was considerably revamped. An entirely new fuselage was built on the plane by the Timm Aircraft Corp., and it housed a new 1935 supercharged Hornet. It was the fastest plane at Cleveland. The windshield was of V-shape design. It cost Turner about $4,000 to revamp the ship. However, it is still of the same general low-wing design. Roscoe wanted to attempt an assault at the world landplane speed record, but the required course for the speed dashes was not set up this year much to Turner's disappointment. His ship was in fine shape and would unquestionably have broken the record.

Benny Howard's "Mister Mulligan," the winner of both the Thompson and the Bendix, is one of the finest racers ever built for the National Air Races. Every part of the plane was carefully worked out by mathematical analysis, emphasis being put on perfect streamlining. All small obstacles that might cause "interference"



Cecil Allen in his Gee Bee before his death crash

Earl Ortman and his Rider-Clarke R.3 racer



The fast revamped Miles-Atwood had engine trouble

Eddie Allenbaugh's racer caused competitors worry

were eliminated. The Venturi cowl was carefully designed so as to fit snug in the nose, allowing a smooth flow of air to pass along the fuselage. Even the windshield blends smoothly into the clean design, fairing neatly into the wing. The nonswiveling tail wheel is also uniquely housed in the tail of the fuselage and offers scarcely any resistance. All connections are carefully filleted. Benny Howard has a novel way of making the smaller fillets by using modeling cement. Art Chester and other racing pilots also used this method of streamlining their ships with much success. Even the paint on the leading edge of the wing is smoothed down with emory paper before "Mister Mulligan" is entered in a race.

Benny Howard designed the plane for high altitude flying (about 17,000 feet) and therefore thought it was advisable to use a Smith controllable pitch propeller for quick take-off and fast climbing. At this altitude he can get about 300 m.p.h. top speed out of the plane, at sea level almost 285 m.p.h.! Oxygen tanks were used for the Bendix dash to allow easier breathing at the high altitude. The ship can carry enough gas to fly from California to Cleveland nonstop under normal flying conditions. Its 500 hp. Pratt & Whitney Wasp Series SE engine consumes 32 gallons an hour with a 14:1 blower gear ratio and a 6:1 compression ratio. Landing speed is slowed down considerably by wing flaps between ailerons and fuselage. They depress 20 degrees.

Mr. Howard made sure his wings would not fall apart. He built them of wood and covered them with plywood as well as internal bracing. An M-12 airfoil section was used with 26 lb. sq. ft. wing loading. The tubular fuselage is fabric-covered except around the cabin where sheet metal is employed. The unbalanced control surfaces are all covered with fabric. Stabilizer is adjustable and is in a slightly negative position. The wire-braced landing gear is very sturdy and is set in rubber mountings to take up the shock.

The gross weight of the plane is about 4,000 lbs., and it has a wing area of 139 sq. ft.

Benny Howard was skeptical about winning the Bendix race because of the very high speed competition he would be up against. But the long range and dependability of the plane and engine together with the long flying experience of its two pilots, Howard and Israel, were important factors in helping the ship take the $4,500 first prize. Though "Mister Mulligan" has a cabin large enough to hold four passengers and much resembles a de luxe sportplane, it was able to outdistance all of the small, swift, one-place racers in the Thompson Trophy Race to win first place.

The Focke-Wulfe German entry with a Siemans Halske motor of 120 hp. which did remarkable exhibition flying. (Kelman Photo)

Jacqueline Cochran's Q.E.D. flown by Roy Leonard in the Bendix was fitted with a new Hornet engine of slightly less supercharging than "Mister Mulligan." Wesley Smith, pilot of the plane in the London-Melbourne race, said he did 260 m.p.h. in Roumania with it and expected that the plane would now do about 280 m.p.h., with the new engine. It carries about 400 gallons of gas.

Jacqueline Cochran's Northrop Gamma was fitted with a double-row Wasp Jr. engine supercharged to 1,000 hp. For some mysterious reason a bad vibration occurred during tests with the plane, and it has been difficult to get rid of it.

Lee Wallace of Fort Worth, Texas, has a special clipped-wing Waco which he had hoped to enter in the Bendix, but for some reason it never reached the starting line. The ship is considerably streamlined and is capable of a speed of about 241 m.p.h.

Earl Ortman had the racer of the most modern construction. It was of all-metal construction, covered by large sheets of Alclad which gave the plane a very clean and smooth appearance. Each tail unit is covered by a single sheet of metal. Large trailing edgewing flaps stretch from aileron to aileron. The cockpit enclosure is just wide enough for Ortman's head. In front of it are several tanks for carrying huge amounts of gasoline. The plane was designed by the famous Kieth Rider of the Rider-Clark Airplane Corporation.

Johnny Worthern, who placed second in the Bendix last year, lost his ship on the way out to the Pacific coast. It was the same Wedell-Williams 92 that he flew to third place in the Thompson Trophy Race last year after a steady advance from last place with engine trouble. The name Wedell has long been predominant in the air racing world, but with the sad deaths of both Jimmie and Walter Wedell there are likely to be no more Wedell-Williams planes built.

Seward Pulitzer was on the Bendix entry list but did not start. He flew the course a few days later in his swift stock model Northrop Delta. Russell Thaw flew the Guggenheims' Northrop Gamma which has extra fuel tanks. Roy Hunt flew F. C. Hall's (former backer of the late Wiley Post) standard Lockheed Orion. Amelia Earhart with her co-pilot and mechanic, Paul Mantz, flew her famous Lockheed Vega in the race.

Owen Tilbury, long distinguished as hav-

(Continued on page 44)

Kling's clipped wing Kieth-Rider won third place

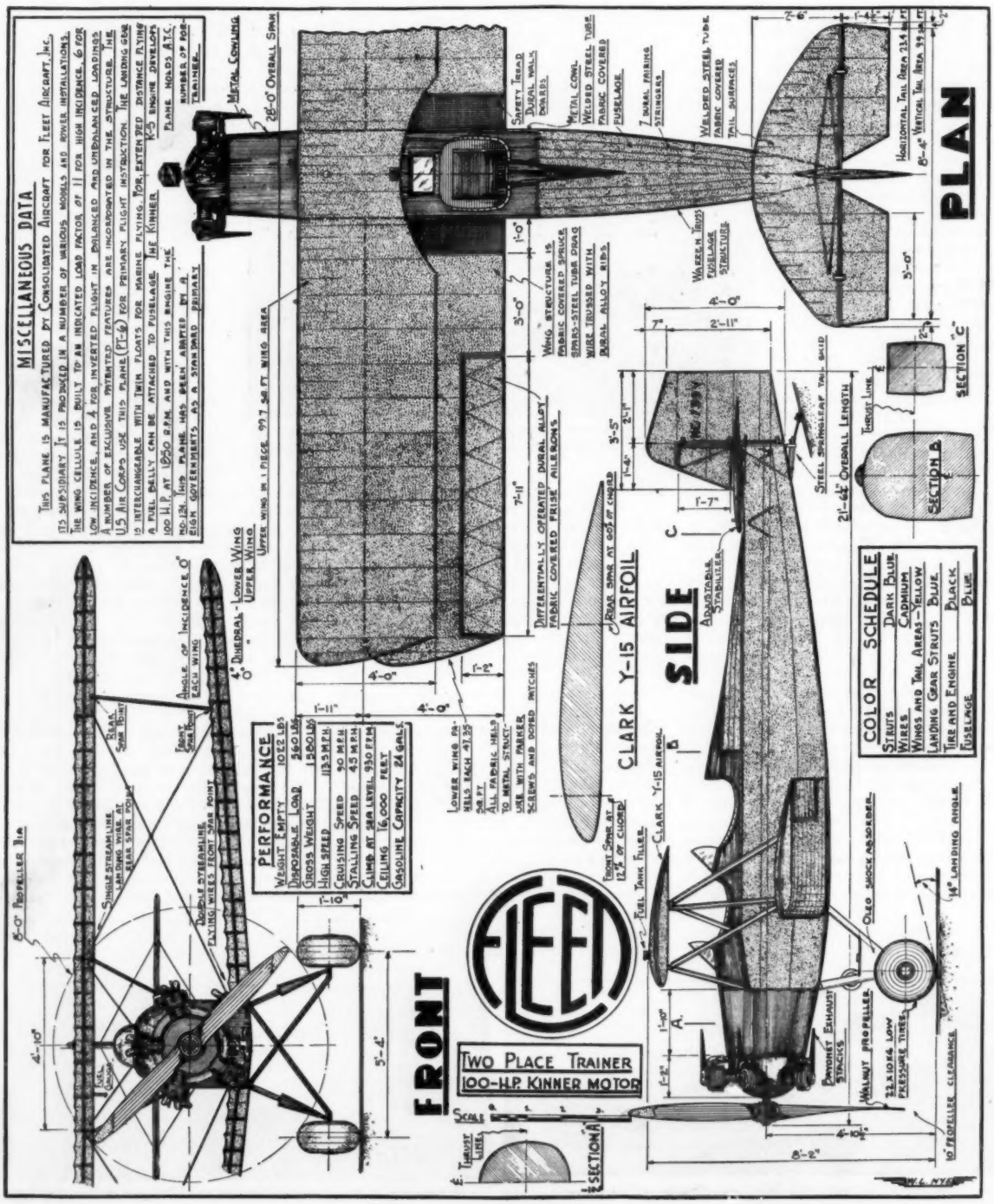
Wittman's racer placed second in the Thompson Trophy Race

What Do Gas Models Mean to You?

ONE of the most educational, enjoyable, and healthful model plane activities that has ever been developed by young men is "gas" model designing, building, and flying. This sport has been initiated by the young men themselves and has been fostered and promoted by the most advanced and authoritative aviation pioneers in the country, both young and old.

It is educational because it provides a means whereby young men may study problems of aerodynamic design and construction embodied in full-scale aircraft. Obvjously there are thousands of young aviation enthusiasts who cannot design or build a full-size plane because of the expense and lack of proper facilities involved. However, they can work out their ideas through the medium of miniature gas-powered models, which provide the same problems in design as a large ship. It also promotes the young man's initiative and provides a channel for unrestrained intellectual expression, an asset which is rare in educational programs, which usually eliminate this valuable element of experiment.

(Continued on page 42)



High Lights of Progress in "Indoor" Design

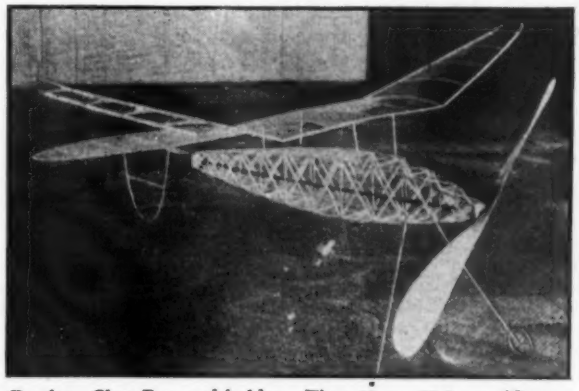
A Resumé of Significant Improvements in the Design of Model Planes and Dramatic Incidents That Have Contributed to Their Development

By HERBERT GREENBERG

Greenberg's 1935 record tractor, time 22 m., 11 sec. Note microfilm propeller

THE science of indoor model airplane building and flying is only nine years old, but in those nine years great advances have been made. The crude, clumsy-looking tractor model of 1926 which had a top duration of three minutes, has gradually been transformed into a streamlined, graceful flyer. The duration attained by the present-day tractor is close to twenty-five minutes. On looking back into the past, one realizes just how phenomenal this progress has been. The duration times have been increased each year by not one or two minutes but by as much as four or five minutes.

The question as to what has caused such advancement presents itself. There are a number of factors that are responsible; namely, research, experience and the assimilation of ideas. We indoor builders have seen the flat, rectangularly shaped, paper-covered wing gradually assume an elliptical shape—the most efficient aerodynamical form. The flat airfoil was suddenly discarded to make way for the better cambered airfoil. The first indoor models had flat wings and were quite successful since a flat airfoil possesses a stable center of pressure travel. Cambered wings had been tried but they seemed to be unstable. It wasn't until Ernest McCoy of Detroit developed his "mystery ship" that cambered wings came to be used exclusively. It took painstaking energy and a great deal of time before the "mystery ship" was perfected, and one does not wonder that McCoy tried to safeguard his secrets by clapping a box over his indoor model every time it landed after a flight. But it is just as well that the secrets did get out for progress was hastened. Aram Abgarian of Detroit used a ship similar to McCoy's and beat out the latter in the Stout indoor event at the national contest. He was able to do this after he had incorporated a few of his own ideas into the model's design.

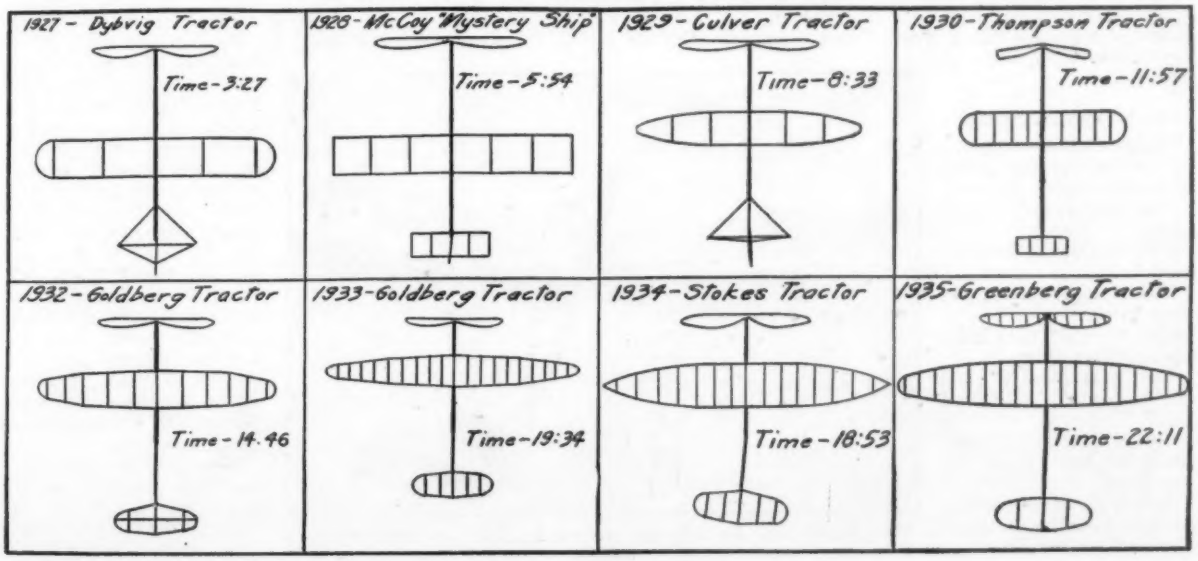


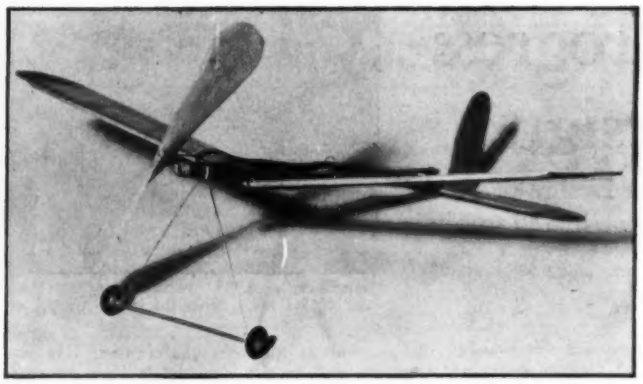
Fuselage Class B record holder. Time 12 m., 23.5 sec. (Greenberg). Note the diagonal paper fuselage braces and underslung fin

The first indoor models were really interesting contraptions. Low wings, covered with a rather heavy grade of Japanese Imperial tissue, were used, and those wings had a moderate amount of dihedral. The first motor sticks were solid, but the advantages of a hollow stick were readily recognized and soon no solid sticks were to be seen on indoor models. The elevator of the first indoor model was kite-shaped and the ratio between its area and the area of the wing was rather small. Consequently, the model was difficult to adjust and usually proved to be too sensitive to obtain consistent flights. One of the original features of the McCoy "mystery ship" was its rectangularly shaped, inverse cambered elevator. The idea for using this was to obtain a steep climb at the beginning of flight when a maximum of power was available, and then to secure a flat glide after the power had given out. This appears to be a makeshift arrangement and possibly it was for that reason that McCoy discarded that design.

(Continued on page 34)

EVOLUTION OF THE INDOOR TRACTOR





A Fine Flyer That's Easily Made

Here Is a Model Plane That Flies Consistently Yet Which Requires Only the Simplest Operations to Complete

By RALEIGH T. DANIEL

TO THOSE who are just beginning in the art of model airplane building or for those who have not yet enjoyed the results of completing a successful flyer, we recommend this model. The design is such that if the instructions are carefully followed, the machine will be easy to make accurately and to true-up. The necessity of obtaining these two conditions cannot be emphasized too strongly as the lack of them is the principal cause of failure to fly properly in all well-designed models.

We believe that many of the more advanced modelists will also want to build this plane because of its rugged construction, ease and economy of building and its consistent and dependable flying qualities. Its climb is remarkable and the stability (model's ability to maintain and regain flying equilibrium) is good.

There is a point which the writer wishes to mention to beginners; namely, the instructions to a working drawing are usually boiled down to a very minimum of words to save space. Hence, those who make up plans and instructions in their work are continually seeking to use expressions arranged in such a way that even the concise, the most logical way for the reader to see it, is the very meaning intended. But don't forget that due to the brief form, the true meaning often has to be "dug out." So it is advised that you study the plans and instructions in a manner to understand them as clearly as possible before starting work. That in general is a practice that will help rocket you to that upper strata of the experts!

Important:—

A graphical description of how to carve a propeller appears on page 26 of the July issue of MODEL AIRPLANE NEWS. It may be helpful to you

List of Material Needed

Motor stick—one 1/8x1/4x14" straight-grained hard balsa that resists twisting.

One 1/8x3/16x18" light balsa.

Two 1/8x1/16x18" medium hard balsa.

Two 1/16x1/16x18" medium balsa.

One 1/8x1/8x7" light balsa for stabilizer spar.

One 1/8x13/32x4½" and one 1/8x1/8x1¾", both hard balsa.

One 1/32x2¼x2½" medium or light balsa for wing tips.

One 1/32x1⅞x5" medium or light balsa for stabilizer tips and for the fin.

One 1/32x3/32x4⅛" bamboo for landing gear spreader bar.

One 7" diameter machine-cut balsa propeller.

Miscellaneous parts—one length of .028" straight music wire. One pair of ¾" balsa wheels. Six ⅛" washers. One bead. One medium-size thrust bearing.

One propeller shaft. One sheet or less of tissue. Six feet of 1/16x1/30" rubber thread for the motor. Cement.

The Wing

An old drawing board is ideal to work on or else get a flat and level, preferably wood surface of some kind. Sand the 1/8x3/16x15¾" leading edge spar to a rounded shape on one edge, see fig. 1, end view. Use sandpaper wrapped around a rectangular wood block. Sand the 1/16x⅛" trailing edge spar on one side to a wedge shape; see fig. 1, end view.

Lay out a full-sized drawing of the wing on your board. Now the wing spars may be put in place directly on the drawing and secured with thumb tacks or weights. Cut the 1/16x1/16" wing ribs to length and cement in place, all except the no. 1 ribs which are not put in until after the dihedral angle is fixed.

Set your compass to scribe a radius of 1⅛" and mark the wing tips on 1/32" sheet balsa so that the wood grain runs with the wing span. Cut out and cement the tips in place. Be sure that your cement is not too thick, for if it is, it will not penetrate the surface crevices and get a real hold on the wood. Make several applications of cement (allowing time between to dry) on all of the various structures. The wing tips are braced with 1/32x3/64x2-5/16" bamboo strips "C," placed on the underside and cemented. It is necessary to cut a notch in rib no. 5 so that the brace may be imbedded in it. The end of the brace punctures into the front spar, see fig. 1.

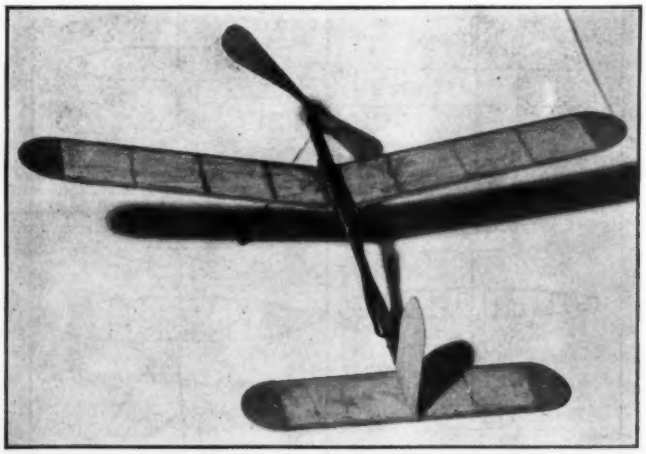
When the wing is dry it may be removed from the board and remember that the top side of the wing was against the board while being made—see the underside structural view in fig. 5.

In order that the model may have lateral stability, the wing tips are raised to give the wing a "dihedral" angle. The method of doing this is clearly shown in figures 6 and 7. The spars are cut halfway through from the underside and cracked up into the position shown.

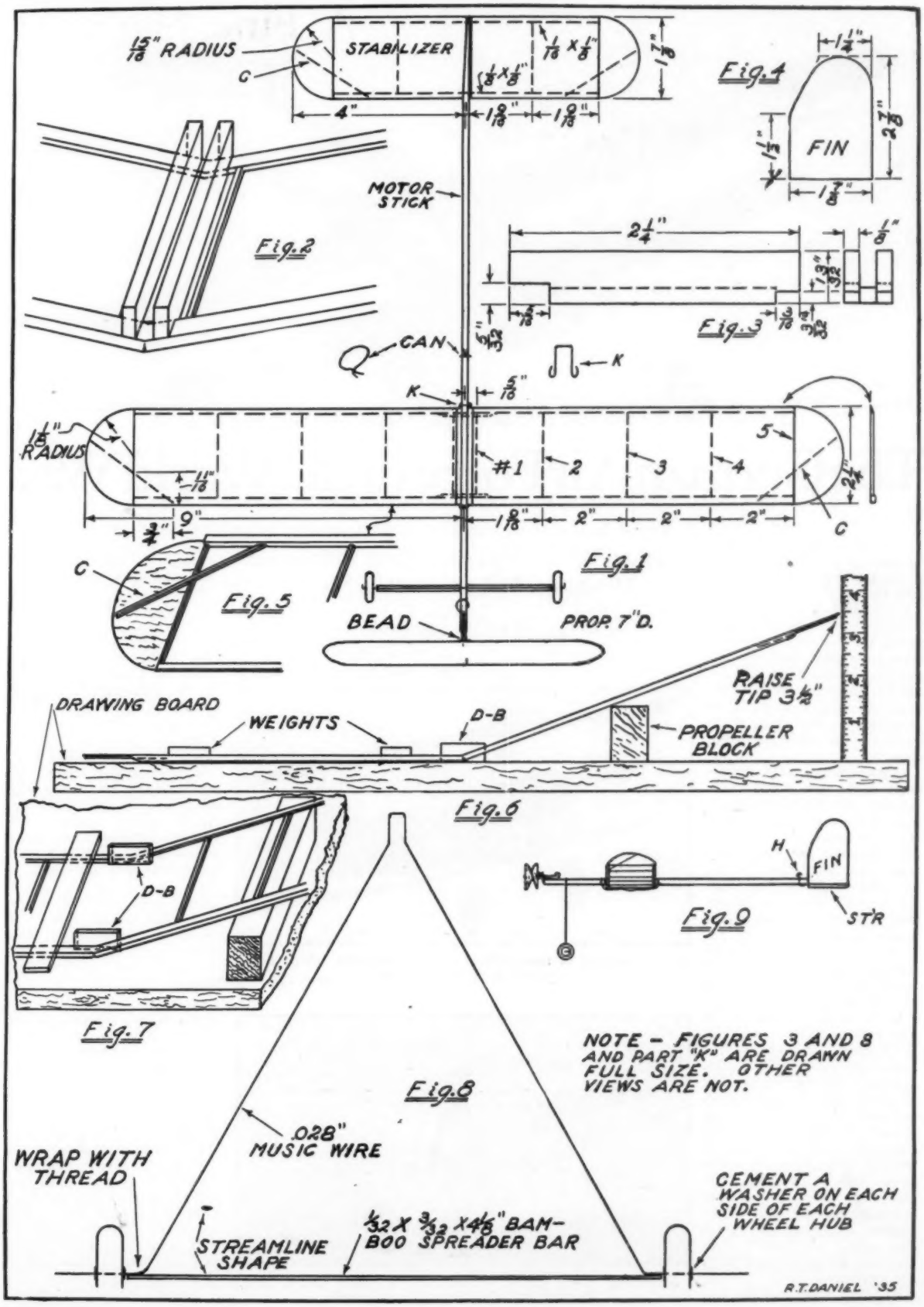
The wing is now placed on the drawing board and one-half is held down flat with weights. A propeller block is then slid (absolutely straight) under the other wing half until the tip is raised 3½". The dihedral blocks "D-B" which are ½" high by 1" long and 1/16" thick, hard balsa, are cemented to the inside faces of the spars as in figures 6 and 7, to permanently maintain the dihedral setting. These are thoroughly cemented and when dry the wing is taken up and the blocks "D-B" are trimmed down until they agree in shape with their respective spars. The no. 1 wing ribs are now cemented in place. The top of the wing is covered with tissue, using tissue cement as an adhesive.

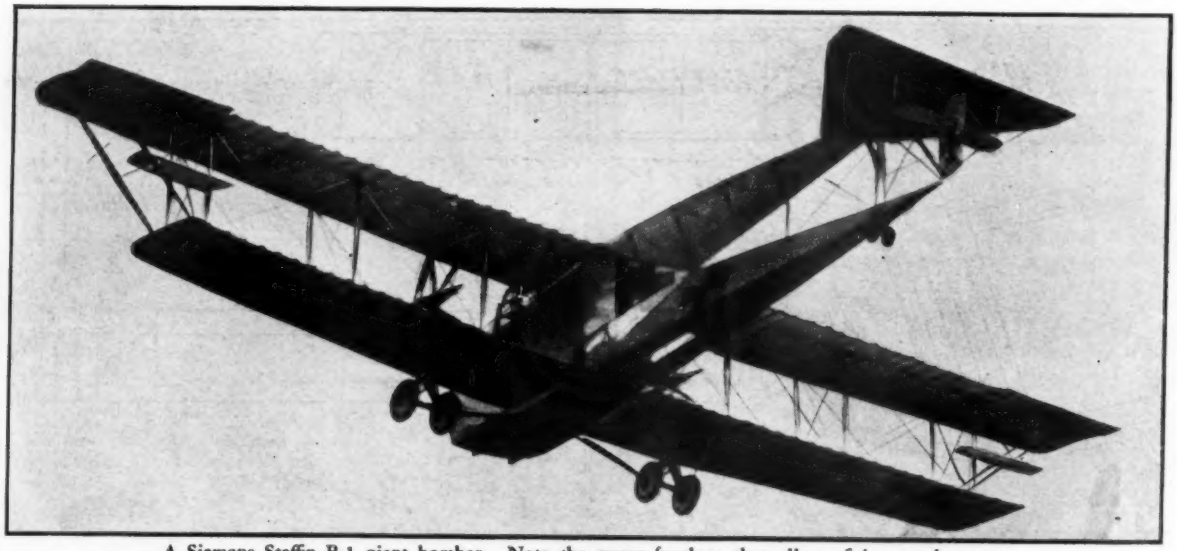
Now make the wing center-block, assembled in fig. 2 and detailed in fig. 3. The center section of the assem-

(Continued on page 32)



The pictures show the little ship ready to fly. The large stabilizer gives stability


15/16" RADIUS
C
STABILIZER
1/16 X 1/8"
1/8 X 1/8"
1 7/8"
4"
1 9/16"
1 9/16"
Fig. 4
1 1/4"
FIN
2 7/8"
1 1/2"
1 7/8"
MOTOR STICK
Fig. 2
2 1/4"
1/8"
Fig. 3
CAN
K
5/16"
1" 15/16 RADIUS
11/16"
#1
2
3
4
5
2 1/4"
9"
3/4"
1 9/16"
2"
2"
2"
C
Fig. 1
Fig. 5
BEAD
PROP. 7" D.
RAISE TIP 3 1/2"
DRAWING BOARD
WEIGHTS
D-B
PROPELLER BLOCK
Fig. 6
D-B
Fig. 7
H
FIN
ST'R
Fig. 9
NOTE - FIGURES 3 AND 8 AND PART "K" ARE DRAWN FULL SIZE. OTHER VIEWS ARE NOT.
Fig. 8
.028" MUSIC WIRE
WRAP WITH THREAD
STREAMLINE SHAPE
1/32 X 3/32 X 4 1/8" BAMBOO SPREADER BAR
CEMENT A WASHER ON EACH SIDE OF EACH WHEEL HUB
R.T. DANIEL '35



A Siemans Steffin R-1 giant bomber. Note the queer fuselage that allows firing to the rear

The German Air Force in the World War

A Vivid Account of All Phases of German War Aviation Which Discloses Much Information Heretofore Unknown—Part No. 1

By ALFRED CELLIER

FROM time to time during the World War, the Imperial German Air Force held control of the air, in spite of the concentration of Allied air squadrons to which it was opposed. On the Western Front alone, at the time of the Armistice, there were three hundred and nineteen identified units. A few of these were flights, operating as special units, while the remainder were Staffels, which is the German name for squadrons.

Opposed to this array of warplanes in the zone of operations, England had eighty-six squadrons; France had one hundred and three escadrilles, or squadrons; Belgium had five squadrons; and the United States, forty-five squadrons. The Allied air strength therefore totaled two hundred and thirty-nine squadrons in the zone of advance. Consequently, it may be wondered why and how, this numerical superiority on the part of the Germans.

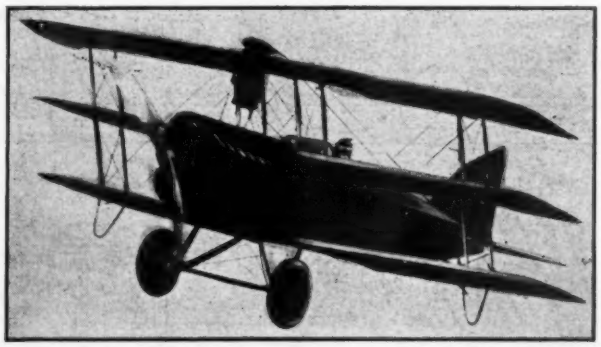
Right up to the end of the war, with all things considered, the German Air Force was on a par with those of the Allies. Control of the air had switched back and forth time and again, and even late in 1918, in various sectors, the German air units were out in force, as will be testified to by many an Allied pilot. This in spite of the fact that they were by necessity forced to have air units on the Eastern front, and to furnish their own allies, Austria, Turkey, and Bulgaria, with pilots and airplanes.

Germany went into the war with about five hundred aircraft. These were all practically of odd manufacture and consisted of Fokkers, Deperdussins, Bleriots and Taubes, both single and two-seater models. Others were hastily commandeered. From the beginning, it is evident that the Germans had plans for the utilization of their air service. The aircraft which they had were completely equipped, which was not the case in those first Allied ships.

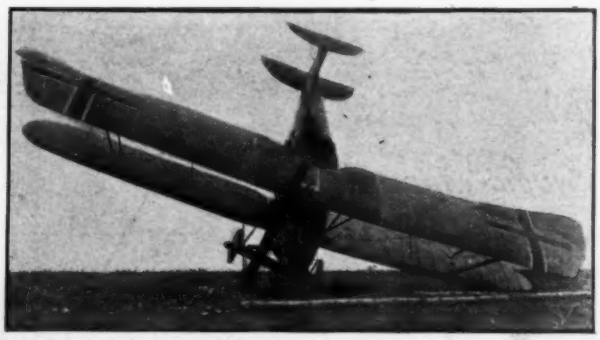
In the beginning, the only use put to the airplane by both sides, was reconnaissance and scouting. As air fighting developed, improved ships came along, and it was mostly a matter of individual combat until the middle of 1916, when aerial combats increased in intensity and number. From then on air fights continued in earnest, and from March until November, 1916, Germany lost six hundred planes.

In March, 1916, General von Hoeppner was assigned as Chief of the Imperial Air Force. Then new ships began to be turned out in quantities, and the service was very much improved. Immediately after the battle of the Somme in 1916, the British Royal Flying Corps had swept the Germans from the sky, but with the reorganization of their air service, they assumed control of the air again, and made things hot for the R.F.C., until the end of "Bloody April," in 1917, when five British pilots died for each German airman who went West.

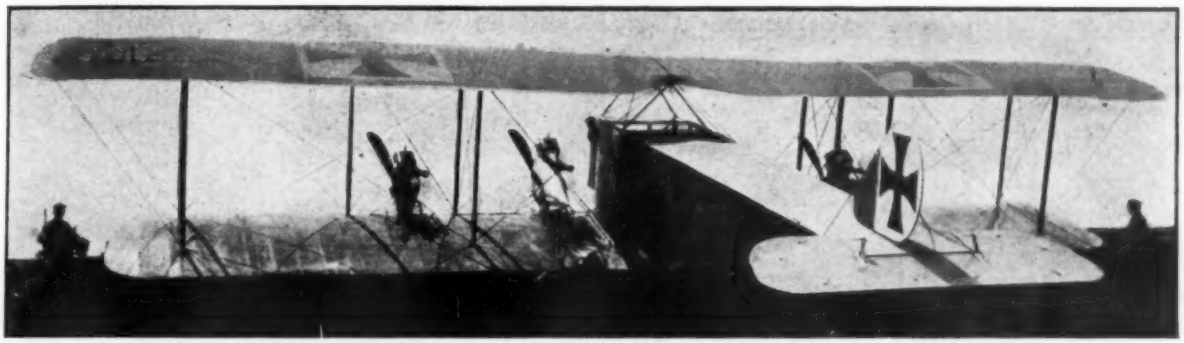
Only the arrival of the Bristol



A Rex triplane of late 1918. It never reached the front. Note parachute pack in center section



A Hanover CL-3A ground strafer that was strafed Oct. 4, 1918, Montfaucon, Montfaucon-Meuse, France



A Siemans Schuckert four-engine bomber: Total power, 44 hp.; speed, 95 m.p.h. At the front in 1917

Fighter, the Camel and the S.E.5, saved the Allies from a serious situation at this time, for while the British were stronger in numbers, the Germans were superior in the performance and types of their aircraft. During this time, many a hitherto unknown German pilot became an ace practically overnight.

It is interesting to note the strength of the various air forces as the war continued. By the end of 1916, it was estimated that there were in excess of twelve thousand airplanes engaged in the war in the skies. Of these, Germany had three thousand, Austria had fifteen hundred, while Bulgaria and Turkey had five hundred between them. These latter were all supplied by the Germans, who also furnished most of the pilots for them, while the observers were in most cases, Bulgarians or Turks; a large number of German pilots also served in the Austrian squadrons. Against these, France and England had five thousand machines, while the Russian air service numbered approximately one thousand effective airplanes. The armament of Germany's aircraft were the Spandau and Parabellum machine-guns. Some of the earlier fighting ships were equipped with the Mondragon auto-rifle, which was an infantry weapon of seven m.m.

The employment of long distance bombing by the Germans, from almost the beginning, naturally led to the continual improvement of these huge ships. Allied air officers were surprised on inspecting some of those which had been shot down to find metal fuselages in many of them, in place of the prevailing wooden ones.

During the first few years of the war, when the Allies were using converted artillery shells for aerial bombs, the Germans had developed special bombs for their aircraft. Their Zeppelin "Giant," five-engined bomber, which was constructed in 1918, had a bomb load capacity of four tons and carried a crew of seven men. Its weight empty was twenty thousand pounds. It would be hard to find any modern military bomber today, which carried that same bomb load.

In 1917, with America's entrance into the war, Germany had another air force to combat, the strength of which was not felt until the following year. Larger formations now began to rove the skies, and as a means of combatting this, in June 1918, the German High Command, organized the "Jagdschwaders," or groups of Staffels. These were each composed of four Jagdstaffels, and consisted of about forty-eight planes.

For the command of these "Jagdschwaders," some of the leading aces were called in. Among these aces, were, Captain Udet, credited with sixty-three victories; Captain Bruno Loerzer, with forty-two to his credit; and Captain Goehring, with ten victories, but admitted to be one of the greatest air strategists of the war. These units became known to the Allied pilots as "circuses," due not only to the brilliantly painted colors of their ships, but also to the fact that they were moved from sector to sector as needed, to reinforce other German air units, just as a circus travels from town to town.

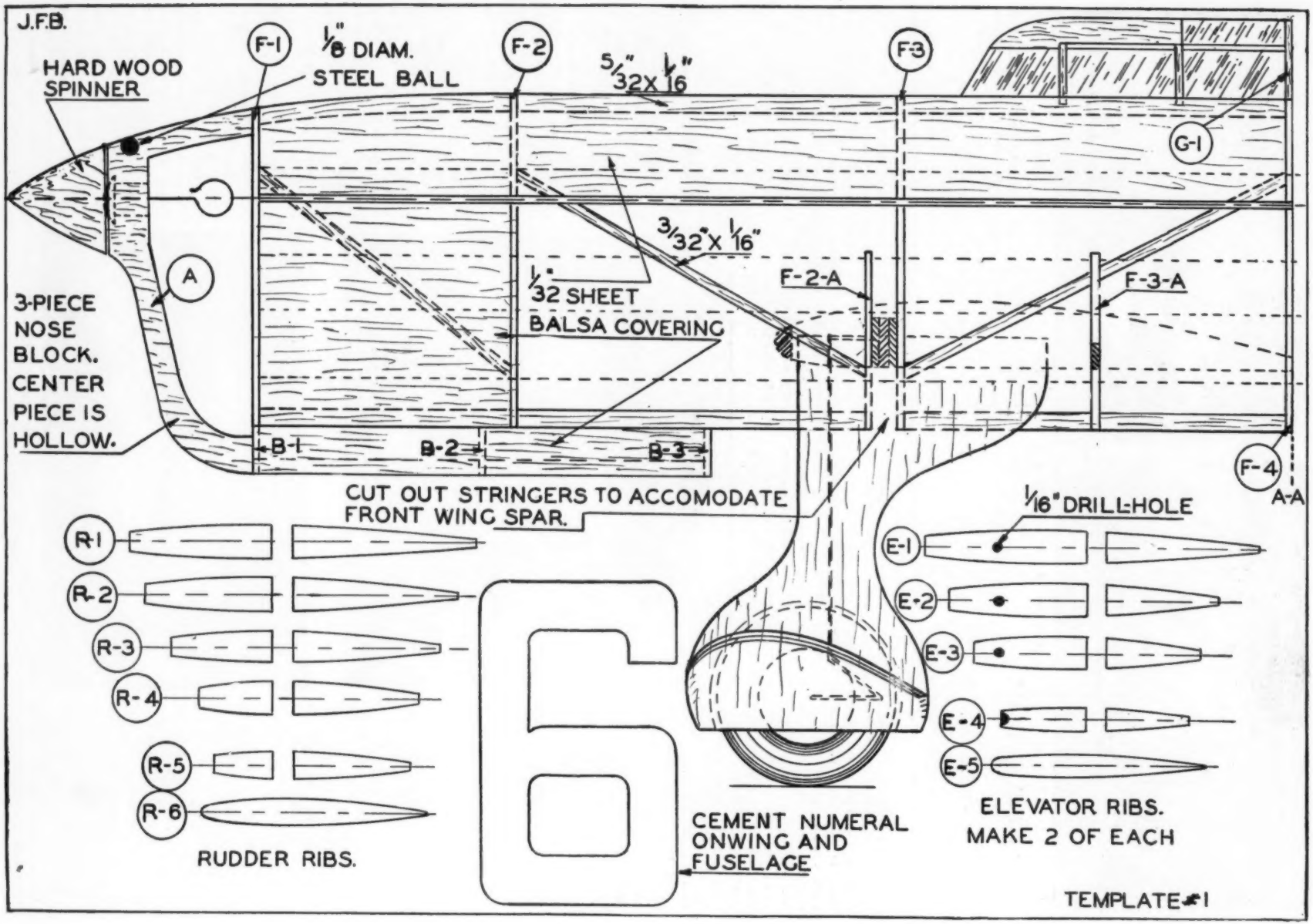
The Jagdstaffels, themselves, were commanded and made up of some of the most daring and outstanding pilots who ever took to the air in winged ships. The deeds of Voss, Schaeffer, Allmanroeder, Wolff, Menckhoff, Berthold, Muller, Bongartz, Boehm, and others, will always be remembered where fighting airmen gather. Perhaps the career of Wernher Voss was the most spectacular of them all. Voss, alone and unaided, flying a Fokker triplane, met his death against odds. Sighting a formation of seven S.E.5s, Voss dove to the attack, well knowing that this unit, number Fifty-Six Squadron of the Royal Air Force, was made up of some of England's leading aces. Among those whom Voss was to meet in his fatal attack on this flight, were McCudden, Rhys-Davids, Maxwell, and Bowman. After twenty minutes of maneuvering, Voss was able to withdraw and probably could have saved his life by doing so. He again plunged into the fight and was shot down by Rhys-Davids, who managed to get on his tail. Skillful as he was, he was no match for the group of aces that he determined to combat. In all, Germany produced one hundred and sixty-seven aces, who had five or more victories to their credit.

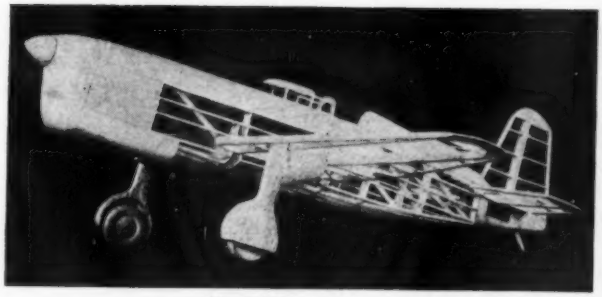
Fokker D.7s on patrol above the clouds

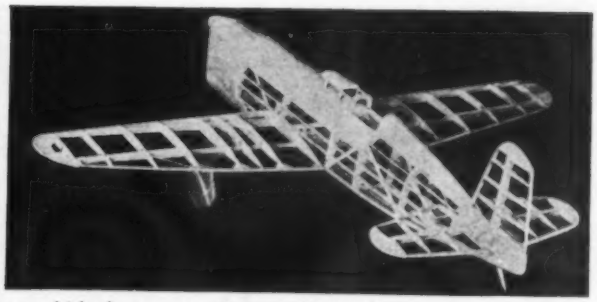
Plane shot down by Frank Luke near Rattantont Sept. 19, 1918. Pilot is under burlap in center

For historical reference, some of the air units of the Imperial Air Force, are worthy of mention. Jagdstaffel One, whose airplanes were distinguished by their red noses and wings, was the outfit in which the famous Baron von Richthofen first saw service. It was later under the command of Captain Reinhardt, an ace with twenty victories, on the American Front, from June, 1918, until the Armistice. Jagdstaffel Two was probably the most famous of all the German Staffels, and was familiarly

(Continued on page 38)


J.F.B.
HARD WOOD SPINNER
F-1
1/8 DIAM. STEEL BALL
F-2
5/32 X 1/16
F-3
G-1
3/32 X 1/16
1/32 SHEET BALSA COVERING
A
3-PIECE NOSE BLOCK. CENTER PIECE IS HOLLOW.
F-2-A
F-3-A
B-1
B-2
B-3
F-4
A-A
CUT OUT STRINGERS TO ACCOMODATE FRONT WING SPAR.
1/16" DRILL-HOLE
R-1
R-2
R-3
R-4
R-5
R-6
RUDDER RIBS.
E-1
E-2
E-3
E-4
E-5
ELEVATOR RIBS. MAKE 2 OF EACH
6
CEMENT NUMERAL ONWING AND FUSELAGE
TEMPLATE #1





Two views of the completely uncovered skeleton which show great refinement of detail

Build and Fly This Famous Racer

How You Can Construct a Flying Scale Model of the Record-Breaking Caudron C.460 of Unusual Grace and Quality

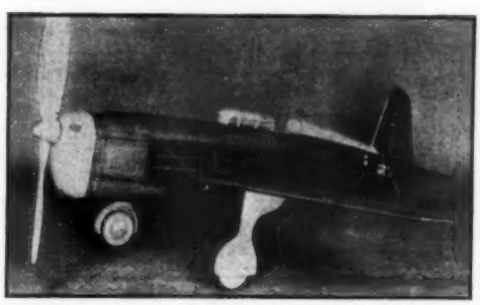
By JOSEPH BATTAGLIA

OF ALL the French racing ships of the "Caudron" type, the plane from which the accompanying drawings are copied is the most outstanding, for it holds the present "world's landplane speed record."

There are several interesting features in this ship; namely, an unusually short wing spread; and in contrast, an unusually long fuselage. Also, when in flight the landing gear, which consists of two "half pants," folds inward into the bottom of the fuselage and wing-root. Aside from the above features, it is a cleanly designed ship, having full monocoque plywood construction.

The top speed is over 300 m.p.h. over a measured mile course.

An interesting feature of its facsimile is the speed at which it travels on eight strands of ⅛" flat rubber, although not quite duplicating that of its large counterpart to scale.



Though a fast ship, the large propeller insures unusual duration and long flights

The plans for this model are full-size and every part is thoroughly described both on the drawings and in the following instructions, so you should have no difficulty in building as good a model as the one shown in the accompanying photo.

Before starting to cut any parts, you should first make a template for each piece, a list of which follows:

1—Wing ribs and wing tips
2—Fuselage bulkheads
3—Head-rest formers
4—Tail ribs and tail tips
5—Fuselage, tail and nose blocks
6—Landing gear
7—Belly radiator formers

These templates may be made from cardboard, bristol board or any other stiff material.

First trace the above parts on transparent tracing paper. Then turn the tracings over on the template paper with the penciled side down. This done, retrace the lines again and when finished you will find that the pencil marks have been transferred to the stiff paper. When this procedure has been finished, cut around the outlines and place each completed template aside.

The Wings

When finished with all the templates, take out the wing rib templates and trace the shape of each one onto 1/16" sheet balsa. Trace all the parts on their respective sizes of wood and then start cutting each one out.

When through with this operation, put aside all the wing ribs.

The front wing spars are made of 3/32" x ⅜" at the root, tapering in plan only, while the rear spar is made from 1/16x 3/16" balsa, tapering only at the outside top to accommodate rib No. 8 as shown in front view.

Cut the spars to the above dimensions and lay them on the top view of the wing panel. Now mark off each rib station on them. When this is done place a sheet of waxpaper over the drawing, lay the spars on it and stick straight pins on either side of them to keep them upright in place.

This done, slide each rib into place and cement it. As one panel is drying, go on to the next, and when you're through with it, place it aside.

By this time the first one should be dry, so take two pieces of ⅛"x9/32"x 9¼" balsa to form the leading edges. Taper these pieces according to the leading edge size of each rib and cement them onto the front ends of the wing panels. To hold them in place, you can either wrap a rubber band around the wing from the leading edge to the rear spar or drive pins through the leading edge to two or more ribs.

While one panel dries, work on the other, and when this is finished and the first one is dry, take a strip of balsa ⅛"x3/32" for the trailing edge, cut it to the proper length and cement it in place, holding it temporarily with pins. Do the same with the other and allow each to dry.

Now make several small gussets from 1/32" sheet stock as shown on top view of wing panel and cement each one in place. While these dry, cut several short lengths of 1/32" square bamboo strips, drive them into their respective positions and apply some cement to each end.

Now take out the wing-tip templates, trace the outline of each on 1/16" sheet balsa and cut out each wooden piece, after which they are cemented to the outer ends of the wings. While these dry, cut out two pieces of 1/32" sheet balsa for the covering underneath the wing, between ribs No. 2 and No. 4. Cement each of these in their respective places, holding them down with a few pins.

The ailerons are next. Measure off two pieces of balsa 1/16"x⅜"x4" to form the aileron spars. These taper to conform with the depth of each rib attached to them and with the shape of the wing where they hinge. Cut them to the proper shape and after marking off the rib stations on each, cement them to the ribs.

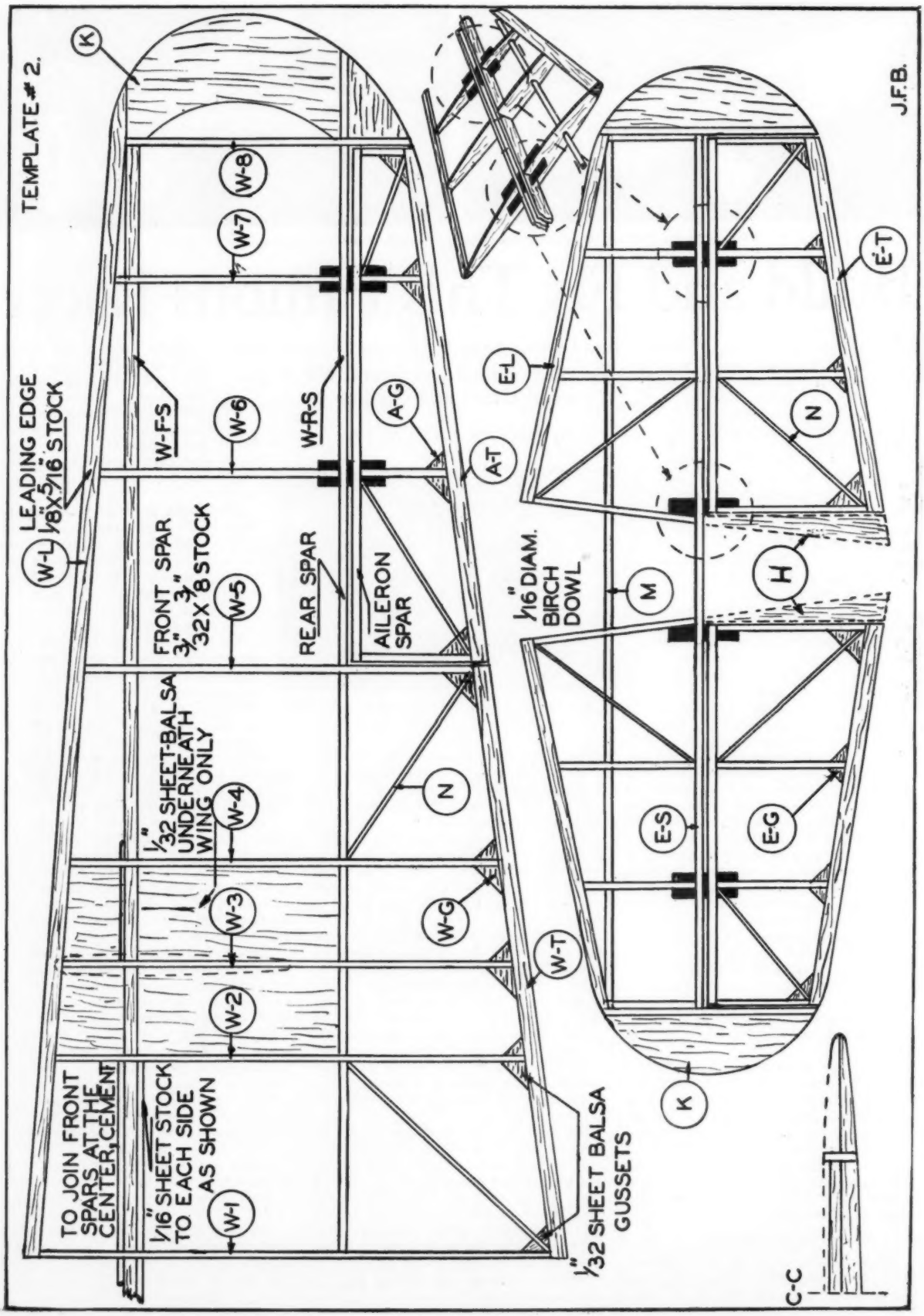
The trailing edges are made from the same size stock as that of the wing, so cut out two pieces and cement them on. Let them dry, then make the gussets and bamboo strips and cement these on also.

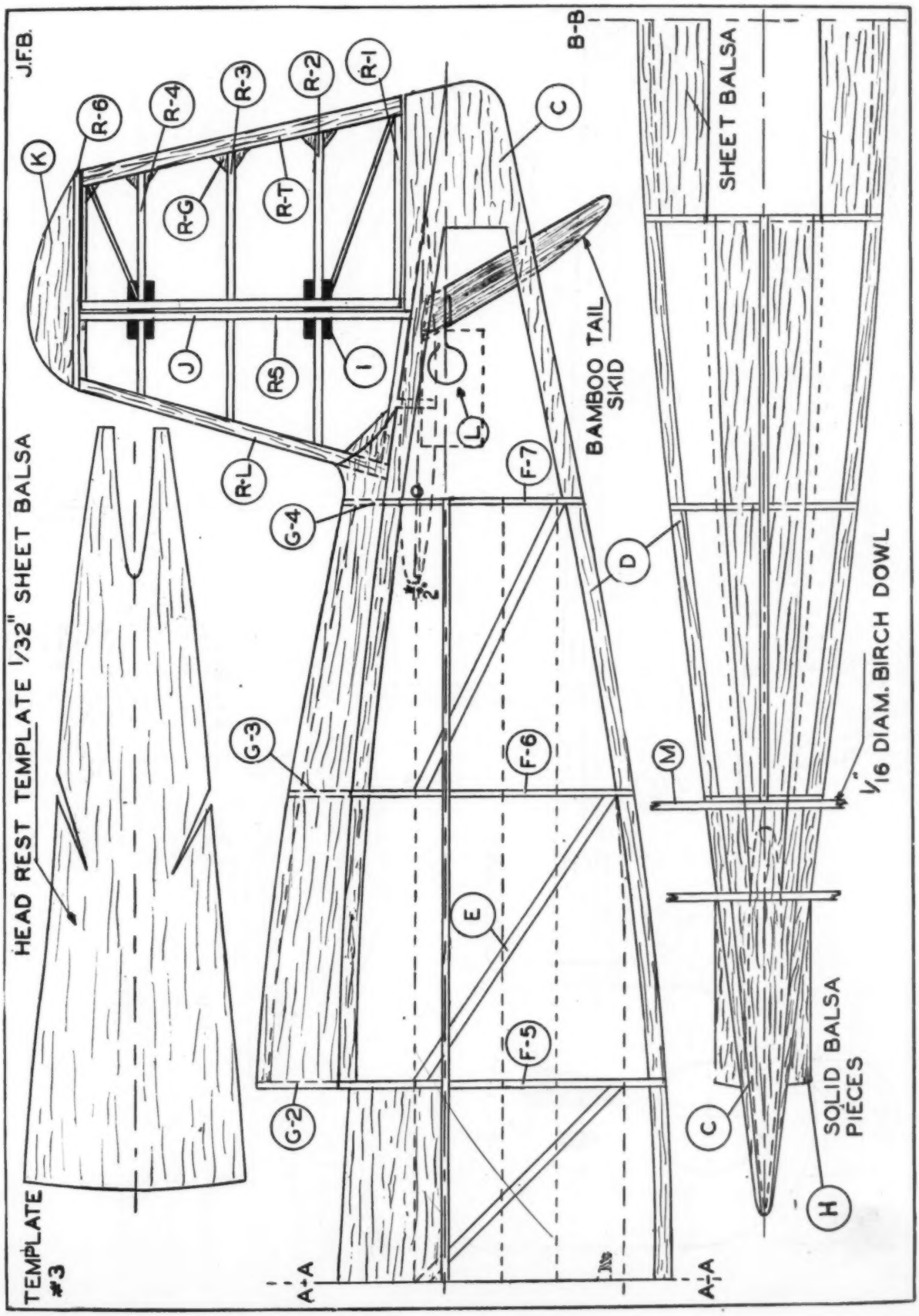
By now the wing panels should be thoroughly dry, so take each one in rotation and sand the tips, leading and trailing edges to the proper shape as shown.

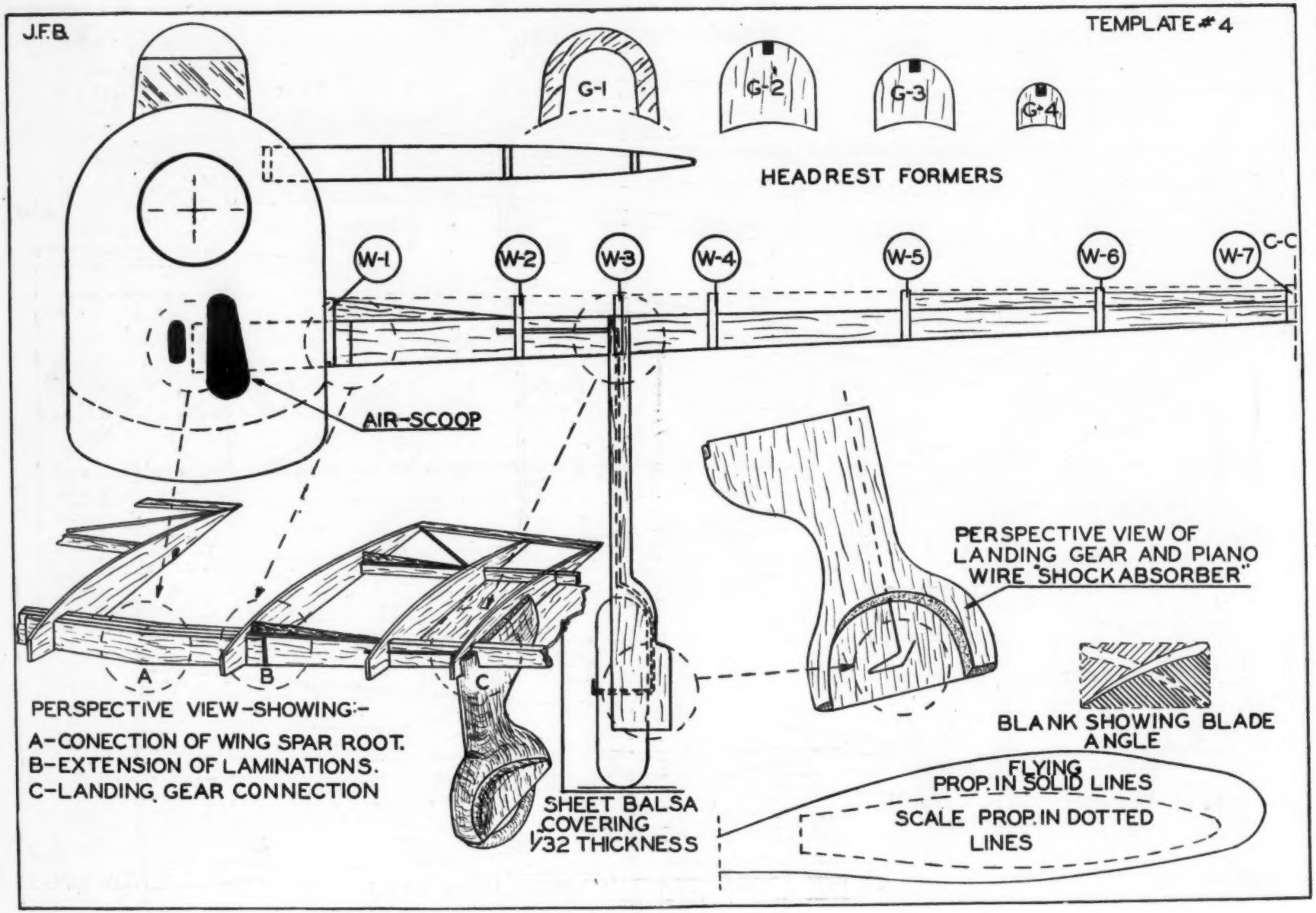
To bring the level of the wing at the rear spar (between ribs No. 5 and No. 8) to that of the aileron, you must cement a 1/16" balsa strip (being 33/32" deep where it meets rib No. 5 and 3/64" deep where it meets No. 8 rib) to each spar at that point on each panel and allow each to dry.

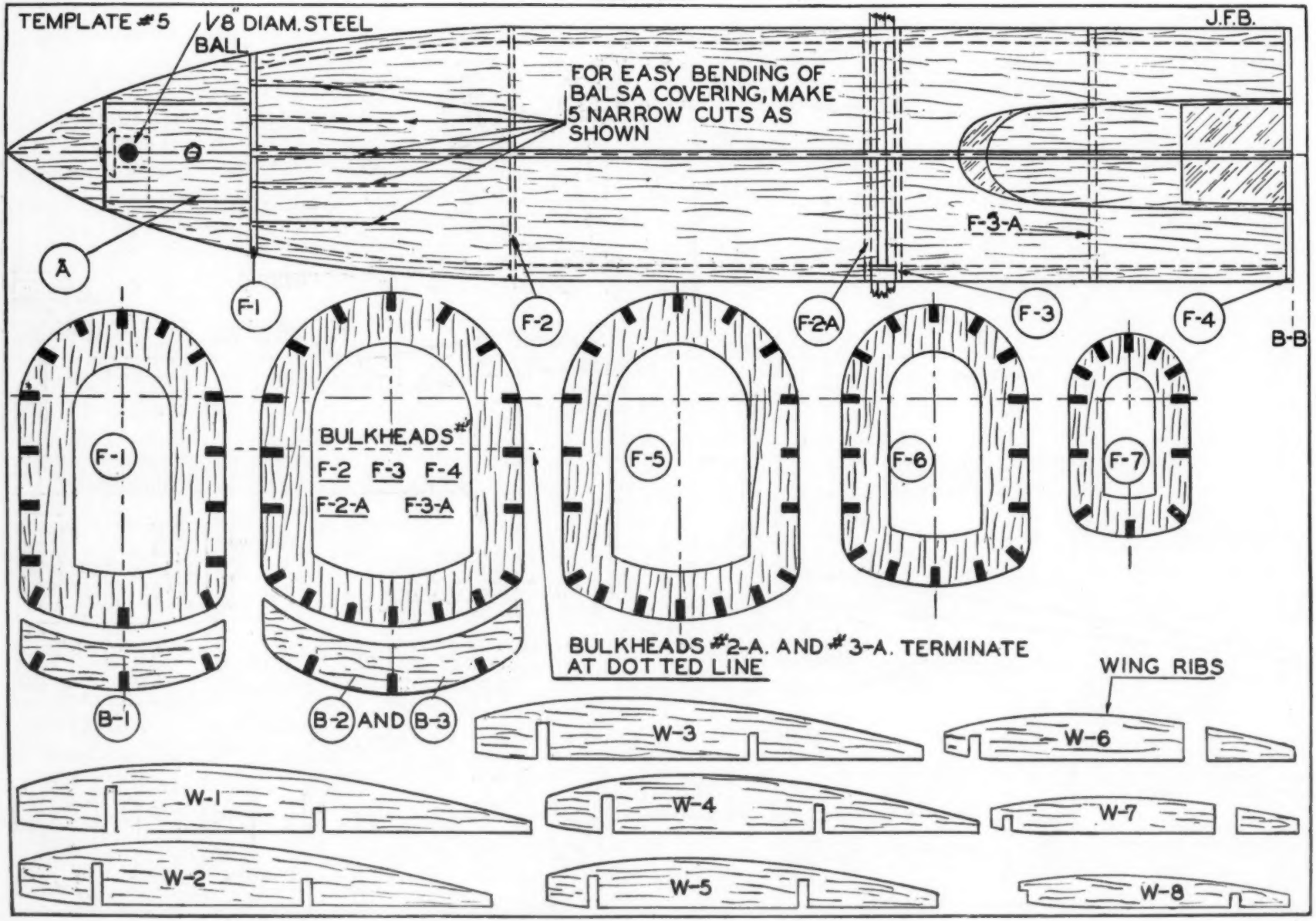
The next step is to join the two halves of the wing at the center. Trace from the front view the correct angle of dihedral and cut two pieces of 1/16" sheet balsa

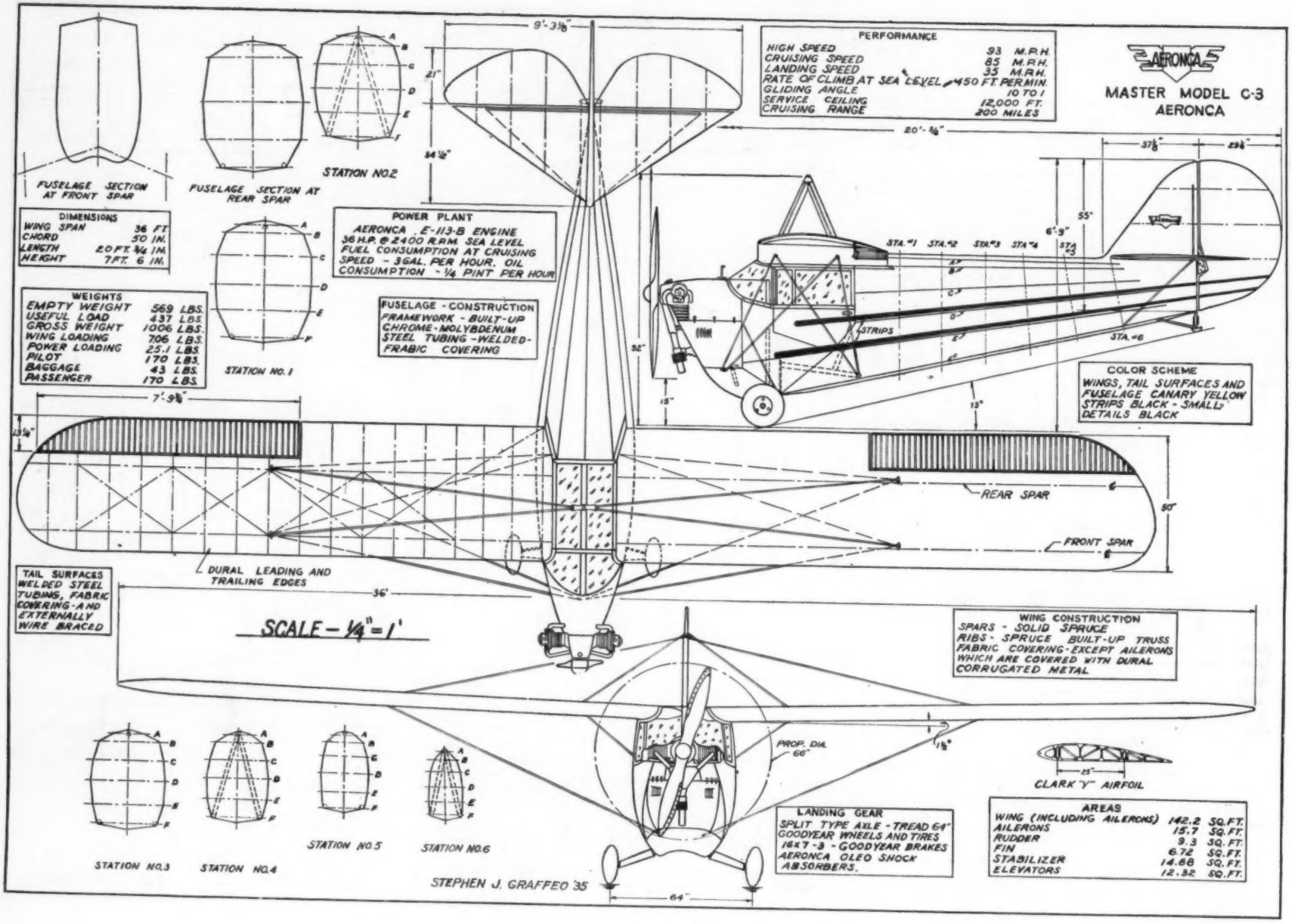
(Continued on page 28)


TEMPLATE # 2.
J.F.B.
LEADING EDGE 1/8" X 5/16" STOCK
W-L
K
W-8
W-7
W-F-S
W-6
W-R-S
A-G
A-T
E-L
E-T
N
FRONT SPAR 3/32" X 3/8" STOCK
W-5
REAR SPAR
AILERON SPAR
1/16" DIAM. BIRCH DOWL
M
H
1/32" SHEET BALSA UNDERNEATH WING ONLY
W-4
W-3
W-2
W-1
W-G
W-T
E-S
E-G
TO JOIN FRONT SPARS AT THE CENTER, CEMENT 1/16" SHEET STOCK TO EACH SIDE AS SHOWN
1/32" SHEET BALSA GUSSETS
C-C


J.F.B.
B-B
SHEET BALSA
BAMBOO TAIL SKID
HEAD REST TEMPLATE 1/32" SHEET BALSA
TEMPLATE #3
1/16 DIAM. BIRCH DOWL
SOLID BALSA PIECES
A-A
A-A
K
R-6
R-4
R-3
R-2
R-1
C
R-G
R-T
J
R-S
I
L
R-L
G-4
F-7
D
G-3
F-6
M
E
F-5
G-2
C
H


J.F.B.
TEMPLATE #4
G-1
G-2
G-3
G-4
HEADREST FORMERS
W-1
W-2
W-3
W-4
W-5
W-6
W-7
C-C
AIR-SCOOP
PERSPECTIVE VIEW OF LANDING GEAR AND PIANO WIRE "SHOCKABSORBER"
A
B
C
PERSPECTIVE VIEW-SHOWING:-
A-CONECTION OF WING SPAR ROOT.
B-EXTENSION OF LAMINATIONS.
C-LANDING GEAR CONNECTION
BLANK SHOWING BLADE ANGLE
FLYING PROP. IN SOLID LINES
SCALE PROP. IN DOTTED LINES
SHEET BALSA COVERING 1/32 THICKNESS


TEMPLATE #5
1/8" DIAM. STEEL BALL
J.F.B.
FOR EASY BENDING OF BALSA COVERING, MAKE 5 NARROW CUTS AS SHOWN
F-3-A
A
F-1
F-2
F-2A
F-3
F-4
B-B
F-1
BULKHEADS #
F-2 F-3 F-4
F-2-A F-3-A
F-5
F-6
F-7
BULKHEADS #2-A. AND #3-A. TERMINATE AT DOTTED LINE
WING RIBS
B-1
B-2 AND B-3
W-3
W-6
W-1
W-4
W-7
W-2
W-5
W-8


MASTER MODEL C-3
AERONCA
PERFORMANCE
HIGH SPEED 93 M.P.H.
CRUISING SPEED 85 M.P.H.
LANDING SPEED 35 M.P.H.
RATE OF CLIMB AT SEA LEVEL 450 FT. PER MIN.
GLIDING ANGLE 10 TO 1
SERVICE CEILING 12,000 FT.
CRUISING RANGE 200 MILES
DIMENSIONS
WING SPAN 36 FT.
CHORD 50 IN.
LENGTH 20 FT. 1/4 IN.
HEIGHT 7 FT. 6 IN.
WEIGHTS
EMPTY WEIGHT 569 LBS.
USEFUL LOAD 437 LBS.
GROSS WEIGHT 1006 LBS.
WING LOADING 706 LBS.
POWER LOADING 25.1 LBS.
PILOT 170 LBS.
BAGGAGE 43 LBS.
PASSENGER 170 LBS.
POWER PLANT
AERONCA E-113-B ENGINE
36 H.P. @ 2400 R.P.M. SEA LEVEL
FUEL CONSUMPTION AT CRUISING SPEED - 3 GAL. PER HOUR. OIL CONSUMPTION - 1/4 PINT PER HOUR
FUSELAGE - CONSTRUCTION
FRAMEWORK - BUILT-UP CHROME-MOLYBDENUM STEEL TUBING - WELDED - FRABIC COVERING
COLOR SCHEME
WINGS, TAIL SURFACES AND FUSELAGE CANARY YELLOW STRIPS BLACK - SMALL DETAILS BLACK
WING CONSTRUCTION
SPARS - SOLID SPRUCE
RIBS - SPRUCE BUILT-UP TRUSS
FABRIC COVERING - EXCEPT AILERONS WHICH ARE COVERED WITH DURAL CORRUGATED METAL
TAIL SURFACES WELDED STEEL TUBING, FABRIC COVERING - AND EXTERNALLY WIRE BRACED
LANDING GEAR
SPLIT TYPE AXLE - TREAD 64"
GOODYEAR WHEELS AND TIRES 16 X 7 - 3 - GOODYEAR BRAKES
AERONCA OLEO SHOCK ABSORBERS.
AREAS
WING (INCLUDING AILERONS) 142.2 SQ. FT.
AILERONS 15.7 SQ. FT.
RUDDER 9.3 SQ. FT.
FIN 6.72 SQ. FT.
STABILIZER 14.68 SQ. FT.
ELEVATORS 12.32 SQ. FT.
FUSELAGE SECTION AT FRONT SPAR
FUSELAGE SECTION AT REAR SPAR
STATION NO. 2
STATION NO. 1
STATION NO. 3
STATION NO. 4
STATION NO. 5
STATION NO. 6
CLARK "Y" AIRFOIL
REAR SPAR
FRONT SPAR
DURAL LEADING AND TRAILING EDGES
STRIPS
PROP. DIA. 66"
SCALE - 1/4" = 1'
STEPHEN J. GRAFFEO '35

Important Facts of Rubber Power

Article No. 46

Pertinent Facts Concerning the Use of Rubber Motors for Power, Presented in Concise Form for Ready Reference

Chapter No. 4

By CHARLES HAMPSON GRANT

IN THE preceding issue of MODEL AIRPLANE NEWS under the title, "Powering Your Planes to Gain Duration," a summary of important facts concerning rubber motors was given in part. It was not completed due to lack of available space. However, it is continued here for the convenience and ready reference of model builders. Inasmuch as the findings of extensive experiments and analysis are given here in concise sentences, valuable help may be obtained easily without lengthy research. The summary continues:

21. In fine strands 1/30"x1/30" in cross-section or less, *lubrication does not increase* the number of turns it is possible to store.

22. The increase in the number of turns possible in a motor due to lubrication ranges from (0) in 1/30"x1/30" when two strands are used, to 55% increase when eight strands of 1/8"x1/30" rubber are used. (Lubricated but *not* stretched.)

23. Stretching the motor to 2.5 times its normal length, when winding it, whether rubber is dry or lubricated, increases the possible number of turns 70%. Multiply hand wound values by (1.7) to determine number of possible turns when stretched.

24. Lubricating rubber has very little effect on the possible maximum torque. When large numbers of strands are used, the motor rubber cross-section remaining the same, the maximum torque increases slightly.

25. The possible maximum torque increases about 60% when the rubber motor is stretched when wound.

26. The amount of work it is possible to store in a brown rubber motor increases about 80% when lubricant is used and motor is wound by hand without stretching.

27. The amount of work that can be stored in black rubber motors increases when a lubricant is used without stretching from 10% in small strand sizes to 50% in large strand sizes.

28. Increasing the *number* of strands used, with equal motor cross-sections, increases the amount of work that can be stored in lubricated motors. The increase is about 20% when the number of strands used approximates ten or twelve.

29. The torque delivered when the motor is unwinding is from 35% to 50% less than the torque required to wind up the motor. The maximum torque is not effected, however.

30. The work delivered when the motor is unwinding is about 77% of the work required to wind the motor.

31. Dry brown rubber delivers a greater average torque than black rubber.

32. Dry black rubber produces a greater maximum torque than brown rubber.

33. Dry black rubber will absorb and deliver a greater number of turns than dry brown rubber.

34. Dry black rubber will deliver more work than dry brown rubber, except when more than ten strands are used, then brown rubber is slightly superior.

35. For equal motor rubber cross-section areas, the greater the number of strands used the less the torque will be for any given number of turns.

36. The greater the number of strands in a motor, the cross section areas being the same, the greater the number of turns it is possible to store in the motor.

37. Square rubber gives more torque and fewer turns than flat rubber.

38. In a motor of a given length, the amount of work that it will deliver is proportional to the cross-section area of the motor regardless of the size or number of strands.

39. Reducing the *size* of the strands in a motor by one-half but increasing the number of strands in order to give the same motor cross-section area, decreases the torque about 8% and increases the turns 8%.

40. After a dry rubber motor has been wound and unwound repeatedly for six or more times, the torque at any given number of turns is less by 15% to 25%.

41. A dry rubber motor increases from 8% to 10% in length after repeated windings.

42. The average torque delivered by a dry brown rubber motor is about 18% greater than the average torque of a black rubber motor.

43. The greatest possible number of turns that can be stored in a dry black rubber motor is about 18% greater than can be stored in a dry brown rubber motor.

44. Dry brown rubber is about 2% heavier than an equal volume of dry black rubber.

Lubricated Motors (Unstretched)

45. A good rubber lubricant can be made by mixing together thoroughly three parts of *liquid green soap* and one part of glycerine. The rubber bands should be smeared with this mixture.

46. In motors of eight or more strands *brown rubber* will deliver a greater maximum torque. In motors of six strands or less the maximum torque is about the same for a given number of strands *whether black or brown* rubber is used.

47. A greater number of turns may be stored in a motor if black rubber is used.

48. When a motor unwinds, the torque delivered drops more quickly when black rubber is used than in the case of brown rubber, which delivers a greater torque, after the first initial burst of power.

49. Brown rubber motors (lubricated) will deliver more energy (work) than black rubber motors, of equal length, strand size, and number of strands. (Work may be taken as an approximate measure of duration.)

50. Weight for weight brown rubber gives from 10% to 18% more energy than black rubber, when lubricated.

51. Nine strands of brown rubber delivers the same energy as ten strands of black rubber, when lubricated.

52. Lubricating increases the maximum torque 15% to 20% and increases the possible number of turns 50% to 60% for brown rubber and 30% to 40% for black rubber.

53. The percentage increase of turns and torque is greater when the motor is composed of few strands than when many strands are used.

54. After the first burst of power, the torque during any corresponding period of unwinding is less in lubricated motors than in dry motors.

55. About 25% more work can be stored in lubricated motors than in unlubricated ones.

56. When very small black rubber strands are used, a greater number of turns may be stored in dry rubber, and whether lubricated or not, the work delivered is about the same.

57. A motor of few and small strands should not be lubricated for best results.

58. The use of lubricant decreases fatigue effect from repeated windings especially in the case of brown rubber.

59. When motors are to be lubricated, use brown rubber.

Lubricated Stretched Brown Rubber

60. Stretching lubricated brown rubber when winding produces a maximum torque which is from (1.6) times to (2.0) times the value of the maximum torque produced by dry brown rubber.

61. The fewer the strands in a motor, the *less the increase* in the maximum torque produced by lubricating and stretching brown rubber motors.

62. Though the maximum torque is increased by stretching the motors when winding, the torque produced as the motor unwinds after the first burst of energy, is about the same as lubricated *unstretched* brown rubber motors.

63. The number of turns that can be stored in brown rubber motors is increased (2) times to (2.4) times by lubricating and stretching them when winding.

64. 110% to 160% more work can be stored in lubricated stretched brown rubber motors than in dry brown rubber motors.

65. The maximum torque is proportional to the size of the strand cross-section times the square root of the strand cross-section area, in lubricated stretched brown rubber motors. It is also proportional to the number of strands times the square root of the number of strands: i.e., it is proportional to $S\sqrt{S}$ or to $N\sqrt{N}$, where (S) equals the strand size and (N) equals the number of strands in a motor.

66. Approximately the number of turns that can be put into a lubricated stretched brown rubber motor is inversely proportional to the square root of the strand

(Continued on page 43)

Hawker Day and Night Fighter (Drawing by N. Barker)

AIR WAYS
HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments

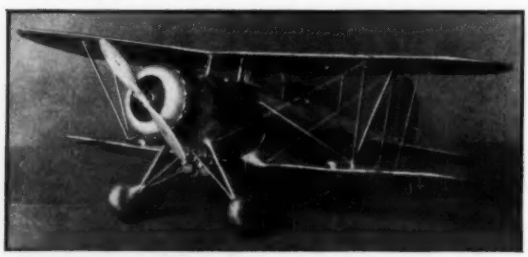
IT IS not difficult to note the remarkable advancement in model airplane building among the young men of the world if one will refer to the Air Ways columns in back issues of MODEL AIRPLANE NEWS. Over the past few years there has been a steady improvement in the quality of work turned out by young men interested in this sport. This indicates that in the future there will be unquestionably a great improvement in large machines and aviation in general, for the model builder of today will be the airplane builder of tomorrow. What a wonderful training these builders are obtaining for their future life work! It is one of the few activities in which work is a pleasure. To those who do not believe that building airplanes is a real, enjoyable pastime, we suggest that they try it and see for themselves.

Our first presentation this month is a very clever drawing by Norman Barker of 139 Evans Ave., Toronto, Ontario, Canada, of the Hawker Four-Gun Single-Seat Day-Night Fighter. This is a picture of one of the outstanding British airplanes. The drawing has an exceedingly professional appearance and we do not hesitate to promise a bright future for Mr. Barker.

A picture of one of the finest models we have ever seen came into this office recently.

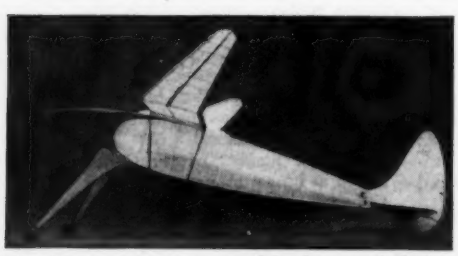
It is picture No. 1, showing a Waco D Pursuit, built by Ernest L. Symms, Jr., of 26 Rosewood Ave., Asheville, N.C. This model required 1,000 hours to build and contains 1700 parts. However, it weighs only four ounces; this is the unusual part about it. Most scale models are exceedingly heavy. Without question this model could be flown, if the builder cared to take the chance of demolishing, in a minute, the labor of hours. Some of the details are: wing ribs built up of spruce stringers, detailed cockpit with aluminum seats, safety belts, throttle, aluminum instrument board with instruments, flare release, stick and pedals, radio, machine-guns and bomb releases. The motor is built up with cooling fins, push rods, rocker arms, spark plugs and all electrical wires, magneto and distributor. It even has a carburetor with a gas line to the tank. The controls are movable.

Another unusual piece of work, picture No. 2, has been turned in by Henry Garttmeyer of 46 Fort Washington Ave., New York City. It is a picture of a 12-inch Curtiss Condor bomber made of solid wood. The comparative size of this model may be seen by the ink bottle which appears at the left of the picture near the plane. The construction of this model is well executed. There are many details, such as model machine-guns in each gunner's compartment. The whole job looks very realistic.



Pict. No. 1. A detail scale model Waco D by E. L. Symms, Jr. It contains 1700 individual parts yet weighs only 4 oz. 1,000 hrs. was required to build it

Pict. No. 5. Don McVicker built this beautiful Boeing 247. The finish is exceptionally fine



Pict. No. 7. A contest model of unusual design and construction by Walter Faryn

Pict. No. 2. A 12-inch solid scale Curtiss Condor by Henry Garttmeyer. Compare it to the size of the bottle

Pict. No. 3. Irwin Ohlsson with trophies he has won and his latest gas job

Pict. No. 6. Lloyd Weygint of the U.S. Air Forces built this fine detail scale Boeing P26-A

Pict. No. 8. J. Penny and his "File" glider built to 1½ scale

Pict. No. 14. A group of prominent model builders at the Bamberger Aero Club Model Convention. Left to right, Leo Weiss, Maxwell Bassett, Joe Kovel with his ten-foot world record ship, Gordon Light, Wm. Wert and Charles Heintz, some of the most expert model builders in the world

Pict. No. 15. Jack Smith and his 16-ft. Bowlus Sailplane that flew with remarkable grace at the North Central Ohio Contest

Pict. No. 9. John Duffecy and frame of his KG gas job

One of the finest gas model builders in the country is Irwin G. Ohlsson of 1439½ Bellevue Ave., Los Angeles, Calif. Picture No. 3 shows one of his latest gas jobs and some of the trophies which he has won in model plane competitions. Mr. Ohlsson writes, "The outstanding difference in this model is the inverted motor, which to my knowledge is new in models, or at least it opens a new field for designing."

It is interesting to note that Joe Kovel's first gas job had an inverted motor on its first trial. It did not operate as well in this position due to oil filling the plugs. Possibly Mr. Ohlsson will give us a hint as to how this difficulty was overcome in his case. It will be very helpful to many builders. The span of the plane is sixty inches. It weighs two and three-quarters pounds ready to fly. This ship at the California State Fair at Sacramento won the gas event with a flight of one hour, three minutes. This is shading Joe Kovel's time very closely. In fact, Kovel nearly lost his record when Leo Weiss flew his model for one hour, four minutes, twelve seconds, at the 1935 National Competitions. Joe's time is one hour, four minutes, forty seconds. This gas job is not only an excellent flyer, but in appearance is one of the finest produced. The cowling around the engine makes it especially realistic. Perhaps Mr. Ohlsson will tell us how this was made.

Our Air Ways would not be complete without giving an example of structural work in models. Mr. J. G. Wheeler of 966 Bank St., Victoria, British Columbia, has submitted the finest example this month. It takes the form of an uncovered framework of a complete Stinson Reliant detailed model built to a ¾" scale, and is shown in picture No. 4. Wheeler says this model was built from a kit of one of our prominent advertisers. Both the builder and the manufacturer of the kit are to be commended for the excellent work.

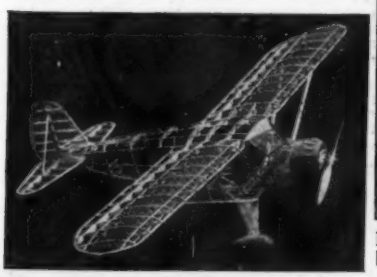
Don McVicker of 252 Pioneer St., Akron, Ohio, gives us a treat by sending us a picture of his solid scale Boeing 247, shown in picture No. 5. The detail of this model is excellent. Even the separate parts of the motors are made accurately to scale. Another unusual feature is the finish. Many model builders have not mastered the art of putting a fine finish on their ships. To do this it is required that the wood be thoroughly sanded and the pores filled. We suggest using a coat of hot glue or wax. The surface should be sanded lightly after the filler is applied. When this is done, several coats of enamel will give an excellent finish. The model measures twenty-four inches in span. It has a completed cabin, landing lights, retractable landing gear. The insignia on the ship is very well done. Many times model builders are not always artists.

An interesting letter has just been received from Lloyd C. Weygint of VP Squadron 5F, Coco Solo, Canal Zone. He says, "My connection with one of Uncle Sam's patrol squadrons does not satisfy my appetite

(Continued on page 46)

Pict. No. 13. Bill Atwood with his model that won at the Cal. State Model Contest

Pict. No. 10. Junior members of the Nishiki Model Club of Tokyo at a contest. Director, Mr. Minowa



Pict. No. 4. Note the clever detail in this Stinson Reliant by J. Wheeler

Pict. No. 11. Russian school children study aviation by building models. Here are some they have built

Pict. No. 12. Louis Schocke and trophies he won at the California State Model Contest

U. S. ARMY HIGHSPEED MARTIN BOMBER

Claimed fastest service bomber in world. Span 53", length 33¼", weight 17 oz. Colored standard U. S. Army yellow, olive drab, details black. Novel and strong method of duplicating an almost impossible landing gear (but not retractable). Complicated fillets beautifully (and easily) duplicated. Nothing ever before like it—even our Boeing 247. Turned Balsa invisible hub wheels. By simply removing motor spars (the only time-proven efficient methods of multi-motor powering) model is ready for exhibition. If sold 5 or more years ago, would easily command at least $20.00. Complete printed-out-wood (Giant) Kit SF-45, postfree..... **$8.50**

TURNER'S WEDELL-WILLIAMS

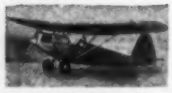
Another ship needing no introduction since our beloved Col. Roscoe controls it wherever she goes. The '34 Thompson Trophy winner. Fast flying model. Color Wedel'-Williams Gold. Has a beautiful "racy" appearance. Has a span of 19½", length 16¾". Kit SF-48, postfree.. **$2.95**

It will be a Merrier Chris

Be good to yourself this Christmas—be good to your model-building friends—get C-D's—the flying models that have set the standard of quality, authenticity and complete satisfaction throughout the model world. Nothing can mean so much to a model builder than getting a C-D Kit—just think of the many happy hours of the most intense fun and educational amusement in building, and the keen thrills of flying the finished model. Of course, between now and Christmas, you'll have ample time to get and build one or two of these C-D models you've been wanting a long time—possibly to give

TRAVEL AIR MYSTERY

Completely redesigned. Span 22", length 15¾", weight 2.2 oz. Beautiful solid appearance. Red, black scalloping, green trim. Kit SF2 ..... **$2.95**



HEATH PARASOL

Span 23¼", length 12¾", weight 0.8 oz. Mostly orange, decorative black fuselage side panel. Excellent for beginners, and a "duration" flyer. Kit SF-26..... **98c**

GB SUPERSPORTSTER

Doolittle's 1932 Thompson winner—and a beauty. Fast flights. Span 18½", length 13⅝", weight 2.1 oz. White, red scalloping. Kit SF-27 ..... **$2.50**

BOEING 95 MAIL

Easy for beginners. Redesigned for beauty and even greater duration than ever before. Span 33¼", length 24½", weight 3.5 oz. Blue and silver. Kit SF-32 ..... **$2.50**

LOCKHEED VEGA

A picture for beauty—a wonder for flights. Span 30⅜", length 21", weight 3.7 oz. Colored brilliant red & cream. Kit SF-24.... **$3.25**

LAIRD SOLUTION

'30 Thompson Trophy Winner. Gold wings and tail surfaces, balance black. Span 15¾", length 13½", weight 2.2 oz. Kit SF-46.... **$2.50**

COMPER SWIFT

Redesigned. Excellent flights. Span 18", length 13⅜", weight 1.4 oz. Beautiful green, with black fuselage design. Kit SF-33 ..... **$1.25**

LINCOLN SPORT

A lightplane sensation. A beginner's model. Span 15", length 12¼", weight 1 oz. Cream, black trim. Kit SF-36 ..... **98c**

WACO "C" CABIN PLANE

New authentic model of America's keenest cabin biplane. Silver wings and tail surfaces, red fuselage, and landing gear, deftly trimmed in black. Span 24¾", length 18⅛" weight 3.7 oz. Very unusual flights. Kit SF-37..... **$3.25**

U. S. ARMY BOEING P12-E

Span 22½", length 15⅝". Excellent army model. Yellow olive drab with red trimmings. Kit SF-8..... **$2.85**

U. S. ARMY BOEING P-26

Span 20⅜", length 17⅜". Very popular. Superdetailed. Yellow and olive drab. Kit SF-23 ..... **$2.50**

CURTISS F11C-S (GOSHAWK)

The plane which needs no introduction as it has already made an excellent name for itself in Navy work. A fine high-speed flying model. A first prize winner in every contest builders enter it. Colored: the characteristic silver with gray fuselage, green tail surfaces, cowl and other trimmings, and yellow upper wing. Span 23¾", length 16¾". Kit SF-49..... **$3.75**

'33 AIR RACE WINNER —WEDELL'S W-WILLIAMS

Span 19½", length 16¾". Very beautiful in appearance and flights. Red, black and bronze. Kit SF-47 ..... **$2.95**

BEAUTIFUL FOKKER D-7 FIGHTER

Span 21¼", length 17". Rich in details. Orange, Green, white, black details. Kit SF-15 ..... **$2.95**

Even the Beautiful New Boxes in which C-D's are now packaged suggest the superfine quality of everything that goes to make up these thoroughbred models—no Christmas wrappings necessary. Silver colored.

And Don't Forget the "Dwarfs"

In addition to the C-D ¾" models you'll want for Christmas, include a group of these popular little "Dwarfs". They are precisely like those wonderful and famous ¾" scale C-D's although with a few minor exceptions—very few, in fact—many being simply smaller precise duplicates except "no liquids". Listed here, in addition to the names and prices of the Dwarfs, you will note only the span is given. For length, simply take ⅔ the length of the corresponding design ¾" scale model and the coloring we suggest is the same as for ¾" scale models.

If you wish to order coloring right with the model, only ½ oz. to 1 oz. of each of the two or three main colors, usually listed first, and paper cement and balsa cement will be needed—except double this for D35 and D45 (Liquids ½ oz. 6c, 1 oz. 10c, 2 ozs. 18c). A 15c package charge when liquids are ordered *must* be included beyond the 10c packing charge you must send for each Dwarf Kit ordered up to the amount of five. When six or more "Dwarfs" are ordered, no packing charge is necessary, thereby saving you 60c or more.

EVERY ¾" C-D KIT CONTAINS

1. Pilot block for carving, with instructions. 2. Coloring for pilots. 3. Coloring for propellers, whether metal or wood. 4. Black for all details. 5. Thread for all bracewires (mostly new silver grey). 6. Printed out wood, not a few places rubber stamped, but every necessary curved piece printed out clearly on the finest grade of balsa wood obtainable. 7. All strip wood necessary. 8. Sufficient dope for the model, cement for glueing it together and tissue cement for applying the paper and coating. 9. Complete material for scale propeller as well as that for flying propeller. 10. Authentic rib and stringer material supplied new in all Kits (many filled-in fuselage jobs, too). 11. And, of course, all necessary insignia, color for striping with tape, special new shaped wood blocks, etc., etc., etc., where needed.

CLEVELAND MODEL

1866NM West 57th St., ★ ★ ★ ★ ★

BOEING 247 HIGHSPEED TRANSPORT

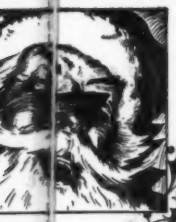
This giant has a span of 55⅝" and a length of 38⅛", and is nothing less than a wizard for flights, with its two motors powerfully pulling. It is entirely gray colored and weighs 16 oz. The redesigned model has all curved wood printed-out (an enormous quantity) with data for more authentic building and appearance than heretofore, with "filled-in" fuselage, balanced contro's, etc. The thoroughly engineered drawing of four large panels (17" x 44"), each contains accurate modeling information and over 16 oz. of liquids, dope cement, etc., contained within each one of the new giant C-D Kits. Kit SF-35, postfree..... **$8.50**

Christmas if you get C-D's!

away as a gift. Get them now—then check off the ones you want Mother, Dad, your wife or relatives to give you for Christmas. Prices are so reasonable, too, for such exceptional values. And you know beforehand that you'll never be disappointed with a Cleveland Kit—our 16 years sincere devotion to designing and building the finest flying models possible is your guarantee of that. If your dealer hasn't yet put in a complete line of C-D's, urge him to do so now. He'll sell lots of 'em, and it will make it easy and convenient for you to get the models you want—when you want them.

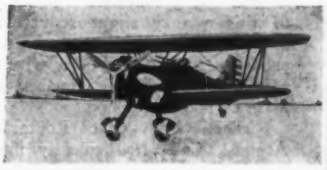
GREAT LAKES SPORT TRAINER

One of the prettiest models available. Far easier to build than our older No. SF-1E and SF-1F. Excellent flights. Includes Cleveland's latest features and loads of details. Span 20", length 15¼", weight 2.1 oz. Orange and cream. Kit SF-1 ..... **$2.65**



CURTISS ARMY HAWK P6E

We claim for this model the distinction of being the finest and most complete authentic flying model on the market today—and she flies very well, too! Colored the usual yellow and olive-drab of the Army with the beautiful color marking of the Selfridge Field Squadron of its characteristic black and white; with black lettering and red striped top wing, along with the red, white and blue insignias. The model should make a 100% wind tunnel model. Every possible detail, wing ribs, stringers, etc., reproduced. Span 23⅝", length 15¾", weight 4.9 oz. Complete Kit SF-21..... **$3.25**



BAYLE'S GEE-BEE

1931 Air Race sensation. Span 17⅝", length 12", weight 2.1 oz. Yellow and black. Kit SF-17.... **$1.95**

A-W QUAD FIGHTER

Very unusual steady wartime flyer. Easy to build. Span 20¼", length 18⅝", weight 2.3 oz. Red, white and blue. Kit SF-11.... **$2.50**

DOUGLAS O-38 OBSERVATION

Span 30¼", length 22⅝". Very beautiful, and unusually well detailed. Yellow, olive drab, black details. Kit SF-43 ..... **$3.75**

VOUGHT CORSAIR V-65

Super detailed, extremely realistic. Embodies latest Cleveland features, including scale rib spacing, "full" motor, etc. Really fine flights. Span 27", length 19⅛". Suggested coloring: blue, yellow, red, black and silver. Kit SF-41 **$3.75**

SUPERMARINE S6.B

Greatly improved model of this Schneider Trophy winner, which will R.O.W. Span 23⅝", length overall 21¾", weight 3.2 oz. Silver and blue. Kit SF-19 ..... **$2.50**

FOKKER TRIPLANE

Plane of Germany's greatest ace, Von Richthofen. Span 17⅝", length 14⅛", weight 2.3 oz. New authentically colored silver nose, white rudder and markings. Kit SF-11 ..... **$2.50**

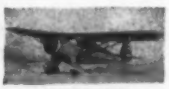
Build this ¾" C-D line of Thompson Trophy Winners

'29	SF-2	$2.95
'30	SF-46	2.50
'31	SF-17	1.95
'32	SF-27	2.50
'33	SF-47	2.95
'34	SF-48	2.95

Complete Set...$15.80 The "greatest" gift for Air Race Enthusiasts.

HAWKER HIGHSPEED FURY FIGHTER

Span 22¼", length 19⅛". Redesigned. Long fast flights. All silver with light blue markings. Kit SF-20 ..... **$2.65**

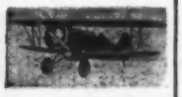


MONOCOUPE

Span 24", length 15¼", weight 2.2 oz. Beautifully colored cream and orange. This design has won many first prizes for model-builders. Kit SF-28 ..... **$2.50**

4-WHEELED HOWARD RACER "IKE"

Span 15⅝", length 12⅜". Flies and climbs beautifully. Also data for "Mike." White, black details. Kit SF-42 ..... **98c**



U.S. NAVY BOEING F4B3 (or 4)

Span 22½", length 15¾". Exciting to build—thrilling to fly. Silver, yellow, and red. Kit SF-29 ..... **$2.85**

AERONCA C-3 SPORTPLANE

Span 27", length 15¼". Keen flights and very easy for beginners to build and fly. Red and silver. Kit SF-40 ..... **$2.65**

HOWARD "PETE"

An easy to build Air Race model—fine flights. Span 15", length 12¼", weight 1.5 oz. All white. Black details. Kit SF-18.... **$1.35**

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SINCE ½" AND ¾" SCALE C-D KITS BUILD UP PRECISELY THE SAME BEAUTIFUL MODELS SIMPLY REFER TO ILLUSTRATIONS UNDER CORRESPONDING NUMBERS. (D's are dry kits.)

When ordering please remember these are "Dry" kits (no liquids included.)

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D-14	Fokker Triplane	11 3/4	.45
D-15	Fokker D-7 Fighter	14 1/8	.50
D-17	Bayle's '31 Gee-Bee	11 3/8	.50
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D-21	Hawk P6-E Fighter	15 3/4	.75
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D-32	Boeing 95 Mailplane	22 1/4	.85
D-33	Comper Swift Lightpl	12	.30
D-35	Boeing 247 Transport	36 7/8	2.50
D-36	Lincoln Sportplane	10	.25
D-37	Waco C Cabinplane	16 1/2	.75
D-40	Aeronca C-3 Sport	15	.60
D-41	Vought Corsair Fight	15	.85
D-42	Howard "Ike" Racer	10 1/8	.25
D-43	Douglas O-38 Obs	20	.85
D-45	Martin Bomber	35 3/8	2.50
D-46	Laird Solution Racer	10 5/8	.50
D-47	33 Wedell's W. Wns	13	.50
D-48	34 Turner's W. Wns	13	.50
D-49	Curtiss F11C-2	15 3/4	.85

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Try your dealer first. If he hasn't what you want, order direct, enclosing check, or money order—cash at your own risk. No C.O.D.'s. On "Dwarfs"—add 10c extra per Kit for packing, if less than 6 are ordered. Please mention your dealer's name and address. Canada, Mexico, British Isles customers—add 10%; all other countries, 20%.

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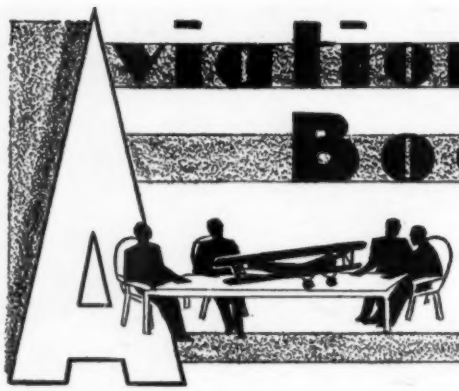
★ ★ ★ ★ ★ **Cleveland, Ohio, U. S. A.**



Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U.S. Army

IT IS not difficult to determine the general trend of thought among model builders from questions received in the Advisory Board Department. A little while ago the majority of questions concerned types of planes, makes, who flew them, as well as a great many questions about war planes. We find now, however, that model builders are giving airplane design more serious consideration. They appear to want to know how to build models that will fly properly. Greater interest is being shown in wing characteristics and problems of stability. This indicates that young men are taking up model building with a more serious purpose in mind. It is to be commended.

Here are a few questions and their answers which we have received recently:

Wes Ringius of 794 Mound St., St. Paul, Minn., has built a Douglas Observation Y10-43 with a 22-inch wingspread and he has been having great difficulty in preventing it from stalling at the beginning of a flight. He wants to know what causes this condition.

Ringius has told us very little about his ship, saying only that it stalls at the beginning of a flight. He does not state whether or not during the rest of the flight the machine performs in a normal manner or whether it glides satisfactorily. We assume, therefore, that it does.

Under these conditions the cause of stalling at the beginning of a flight is usually due to too great an angle between the wing chord and the stabilizer chord. The way to correct this is to raise the front edge of the stabilizer, giving it a greater positive angle of incidence. We suggest that Ringius raise it 1/32" at a time, trying out the model between each new set-up to determine whether or not the ship performs properly. When the proper setting is determined it may be that the ship will be nose-heavy while gliding. If this is the case, weight the tail slightly and readjust the stabilizer until the flight of the model is perfect.

Question: Has the wing area anything to do with this condition?

Answer: Absolutely not. The only way that the wing area would have a bearing on this matter is in regard to the proportion of the stabilizer area to the wing area. Too small a stabilizer area relative to the wing area would cause erratic and possibly stalling flights.

Question: What are the high speeds of the Boeing P12-E, P12-F and the F4B-4?

Answer: The high speed of the P12-E is about 185 miles per hour. The P12-F does over 200 miles per hour, as does the F4B-4.

Question: What is the purpose of scalloped wings?

Answer: There is no definite advantage, but is merely the form of construction chosen by the designer. In such a type of wing the thickness of the trailing edge is reduced to a minimum; possibly because of this a very slight reduction in drag might take place. Scallops on a wing are produced by the use of a wire along the rear tips of the ribs, instead of a stiff piece of metal or wood.

Richard G. Fuller of Route 1, Box 44, Aromas, Calif., is evidently interested in tailless airplanes, for he asks:

Question: Where is the center of gravity placed on a tailless plane in relation to the normal center of pressure of the wing?

Answer: The center of gravity is placed slightly ahead of the normal center of pressure of the wing, the same as in other airplanes. The only difference between a normal airplane and a tailless airplane, in regard to the tail effect, is that the tail effect is accomplished by a negative angle of incidence at the wing tips which is used in combination with a sweepback on the wing, and which acts the same as a negative angle on the tail. In effect, you have two small surfaces at the end of the wing which give you the effect of two tails. The wing having a sweepback they are to the rear of the center of gravity. The down pressure on this balances the down pull of the center of gravity forward of the center of lift. The speed of the airplane changes the values of the tail pressure so that this, acting in conjunction with the constant values of the center of gravity and lift, make the airplane nose upward or downward.

Question: How large should the rudders be?

Answer: This is rather a difficult question, inasmuch as every airplane should have different size rudders, depending upon its design. We suggest that you make the total combined areas of the rudders equal to the area of the vertical surfaces of an ordinary airplane.

Question: How much sweepback do you use?

Answer: You should use at least thirty degrees on each wing.

Question: Does it need sweepback?

Answer: Yes, unless some other method is used to dispose the negative wing tips considerably to the rear of the center of gravity.

Question: How can you remove dope and ambroid from your hands and from brushes after it has dried?

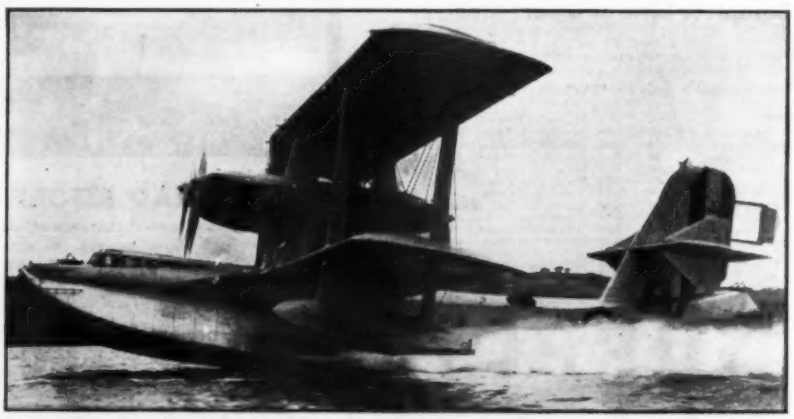
Answer: The hands or brushes should be soaked in amyl acetate or acetone. This will dissolve the ambroid.

Leon F. Kubinski of 859 East Church Street, Elmira, N.Y., wishes to know:

Question: What characteristics determine the design of a wing section expressly for soaring?

Answer: Such a wing section is usually of medium camber height. That is, the

(Continued on page 28)



One of the giant short 5580 hp. flying boats R.6/28. It is driven by six Rolls Royce Buzzard Engines. (Courtesy Imperial Airways)

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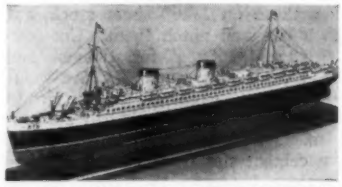

20"—scale 1/32" to the foot. Patented Hull Design Shaped hull and over 100 metal fittings. 24 cast metal lifeboats; 24 cast stairways; 2 cast anchors; 4 metal propellers; 6 cast bits; 48 metal davits. The Rex comes in beautiful high luster original colors of black, orange, white, red and green; and the kit also contains turned wood parts, printed wood, cement, wood filler, sandpaper, etc. **postpaid**..... **$6.00**

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Full size plan—scale 1/32"—sheet 34" x 44"—full instructions—7 photos—25 detail views. Everything included complete, **only 25c postpaid.** Regular value $1.00.

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Scale 32½" model 1/32" to the foot. New, patented hull design.

Here is a dream of a boat model that you will want to build. Normandie has a shaped hull and over 100 metal fittings—over 1000 portholes—60 metal davits—30 life boats—16 winches—24 cast metal stairways. Comes complete with all the beautiful, original high luster colors, cement, full size plan, turned wood parts, printed wood—printed fiber patterns, and everything complete that is necessary to build this model.
Postpaid..... **$7.00**

NORMANDIE PLAN

Full size plan—scale 1/32"—sheet 34" x 44"—full instruction—7 photos—25 detail views. Everything included complete, **only 25c postpaid.** Regular value $1.

NEW IDEAL TRU-CUT NIFE

The IDEAL knife for building models—Tru-Cut Nife. Send for this new, keen, patented, razor-edged knife. Securely fastened to a long holder it can follow intricate curves; cuts balsa like butter! Excellent for every cutting purpose. **15c postpaid. Extra blades 3 for 10c.**

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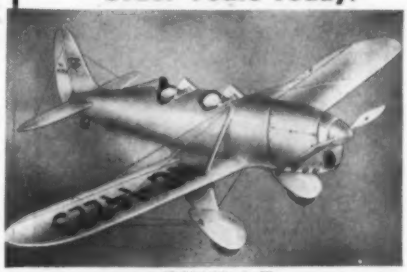


RYAN S T

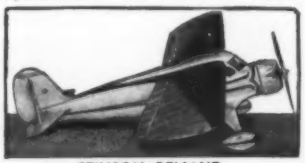
Wingspan 22½", length 16½", weight 2½ oz., scale ¾". New fast Ryan has dual control system which operates in either cockpit; adjustable wing flaps; plans for making an actual working engine—4 cylinders with movable pistons, carburetor and spark plugs.
Complete kit..... **$1.50**

BOEING P-26A

Wingspan 21¼", length 18", weight 2½ oz. Exact ¾" scale. This flying model is an exact replica of the famous fighter—one that is identical in all but size with its noteworthy big brother. Beautifully colored in olive drab and yellow. All Super-Detail parts included. Kit complete, postpaid..... **$1.75**

CURTISS GOSHAWK

Wingspan 23⅜", length 16¾", weight 3⅛ oz., exact ¾" scale. Coated with new IDEAL high lustre finish, with silver, yellow, red and black coloring. Kit complete, postpaid..... **$2.00**



STINSON RELIANT

Wingspan 32 5/16", length 21¼", weight 3½ oz., exact ¾" scale. Adjustable speed arresters built into the wings, movable cabin doors, complete interior with four seats and control column, and all the other Super-Detail features. Colored in bright contrasting yellow and black. Kit complete, postpaid..... **$2.50**

MARTIN BOMBER

Wingspan 35", length 22½", weight 4⅛ oz. Exact scale. Retractable landing gear, rotating gun turret, movable machine guns, special streamline cowlings, two types of 3 bladed propellers—one for flying and one for exhibition with removable motor sticks for flying; rudder and elevator balanced surfaces; new type freese ailerons. Kit complete, postpaid..... **$3.50**

camber is about ⅛ to 1/9 the chord length; camber being the height of the arch of the upper surface from the chord line. Such wing sections usually have a rounded leading edge and a slight concavity on the undersurface toward the trailing edge. It should be a section which has a high lift to drag ratio and yet, which has a high lift. A slightly concave undersurface at the rear makes the lift coefficient fairly large, while if the streamline effect of the section is kept, the L/D will be very good. The undersurface near the leading edge should sweep downward slightly from the nose and sweep backward to form a concavity near the trailing edge. This concavity should be disposed from the trailing edge forward for about ½ to ⅔ the chord length. Many of the latest N.A.C.A. sections would be suitable.

Build and Fly This Famous Racer

(Continued from page 15)

to the shape of the front spar between both No. 1 ribs, extending 3/16" beyond each rib. Make two pieces this shape to act as re-inforcements for the spar roots.

Hold the wing at the proper dihedral angle by placing a block under each wing tip and cement these pieces to the center section of the wing on either side of the spars. Drive pins through them to hold them together and allow to dry.

There is no connection between the rear spar for practically all of the flying and landing stress is sustained by the front spar, so the wing is now finished. Now sand the ailerons as you did the wing and when through put them away until needed.

The Tail

Take out the elevator rib templates and trace them on 1/16" sheet balsa stock. Make two of each, a front and rear half for all but No. 5 as shown on Plate No. 1;—front and rear halves for each rib, after which you drill a hole in each one to accommodate the front stabilizer spar. Cut a balsa strip 1/16"x¼"x6¾" for the rear spar of the stabilizer and 1/16"x¼" x3" for each half of the elevators. You will notice that the front spar of the stabilizer is made of 1/16" diameter birch dowel. Cut this spar also to its proper length.

Now cement the rear halves of ribs to each elevator spar and stand them with the spars facing flat on the board and the ribs upright. Force the 1/16" dowel spar through the holes in the stabilizer and after lining them up on the drawing, cement them in place. Cement the rear stabilizer spar in place and stand it up similar to the elevators. When the elevators have dried sufficiently, cut two pieces of ⅛"x1/16" balsa for the trailing edges and cement them on.

While these dry, trace and cut the tail tips and by the time this is done, the stabilizer should be ready for the leading edges. Cut these from 3/32"x5/32" strips and cement them on. Then go back to the elevators and cement in the gussets and bamboo strips.

When the stabilizer is dry, cement rib No. 5 in place on each end and when these are dry, attach the other tips. Allow these to become solid, then sand the leading and trailing edges and all else to the proper shape. Then cut and cement in all the aluminum hinges as shown. To make the rudder, repeat the above process.

The Fuselage

Take out all the fuselage bulkhead templates and those for the underslung radiator and headrest.

Trace these on 1/16" sheet stock, cut out each one and notch them. Cut several strips of 1/16"x⅛" for stringers and choose 4 of the strongest for the longerons. Then lay each one on the drawings and mark off the bulkhead stations on them.

Now cement the front end of the top and bottom longeron to former No. 1. Allow these to dry, then cement formers Nos. 2-3-4 in place and allow these to dry also. Fasten the two side longerons in place and when these are thoroughly dry, slip in and cement all the other bulkheads. In placing in the other stringers,

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you should be careful to keep the bulkheads perfectly lined throughout. To do this the first three stringers on the top, bottom, and both sides, should be cemented in place and allowed to dry. When this has been accomplished, the remaining stringers can be put in. Cut several pieces of 3/32"x1/16" to form the cross members of the fuselage marked "E" and cement each in place as shown in side view.

Tail and Nose Blocks

The nose portion of the fuselage is made in three pieces, namely, the center piece which is hollow as shown in side view of fuselage and the two side outer pieces which are solid. Trace and cut each one out. Then cement them together, holding them with pins. While this dries, make the fuselage tail end block.

In making this part you repeat the previous procedure of making the nose with exception of shape. After making the three pieces, cement them together and pin the sides down. Now take the nose piece and pressing it against bulkhead No. 1, trace the outline of the latter on it. Then curve and sand it to the proper shape, after which you cement it in place.

By now the tail block should be dry, so place the front end of it against bulkhead No. 7 and trace the shape of the latter on it. Now curve and sand it down and cement it on.

The radiator is next. The formers for this should have been made along with those of the fuselage and headrest. If they are finished, all you have to do is to cut 3 strips of 1/16"x⅛"x3 9/16" and after marking the bulkhead stations on them, cement them to the formers. When this is dry, cement each former to the bottom of fuselage as shown in side view.

Now take the 1/32" sheet to form the covering for the top of the fuselage and the radiator and cement each in place holding each down with small rubber bands or pins. You will note on the top view of the fuselage at the front end that there are shown in dotted and solid lines, five narrow slits. These are made to allow easier curving of the fuselage covering. Make these cuts as shown before applying the sheet stock to the model.

Now cement the headrest formers in place, cut a piece of 1/16"x⅛" strip to fit the length between formers Nos. 2 and 4 and cement it in place. While this dries make the headrest 1/32" sheet covering as shown. Then cement it in place holding it down with pins.

Cut out the cockpit and sand down all the sheet covering smoothly.

The Wind Screen

This part of construction can be made to either slide back over the cockpit or remain permanently in either open or closed position. It is made of 1/16" square balsa strips and a solid piece for the dome. The rear bulkhead is shown in the front view drawings and is marked "G-1." Build it as shown, but do not fasten it on until after covering the model.

The Landing Gear

The landing gear is made of one solid

piece of either hardwood or balsa. Trace each one from the template and carve them to the proper shape, as shown in front, side, and perspective views. Carve out the side facing inward to accommodate the wheels and "piano-wire" axle. This done, make a 1/16" slot along the top of each from front to rear to slide over No. 3 rib. Then drill or burn a hole the diameter of the piano wire from top to bottom so as to insert the shock absorber wire. Bend the wire of guage .013 to the shape shown in front, side, and perspective views and insert it in place. Slide a hardwood wheel on each wire and bend the ends upward.

The next thing is the tail skid and rear rubber hook. First, bend the hook with sufficient extra length. Then make the skid of ¼"x1/16" bamboo. When this is shaped, bend the straight end of the wire around it at the point shown in side view. Cut a slot in the bottom of the tail block and force the skid and hook in place.

In the side view of the tail block is shown a rectangular opening on the left side of the fuselage to allow insertion of rubber. Cut out this portion of the tail block and through this pour the cement onto the upper end of the tail skid. Now drill a ¼" hole in the nose of the ship to fit the nose plug and cut a shallow trough ½" diameter for the mushroom head of the plug to fit in. The propeller spinner and the plug can be bought ready made or spun on a lathe, preferably of hardwood. The propeller should also be of hardwood to keep as much weight as possible up front.

Drawings for two different types of propellers are shown in plate No. 4. The one in solid lines is for flying and the one in dotted lines is for scale use. The flying propeller should be carved from one full-size double-ended block and not in two halves, but the scale propeller can be made either way. After carving the flying propeller, make a slot in the spinner and insert the blade. Cement it on after truing them up with the propeller shaft, bend the front end of the shaft upwards on the front of the spinner and cement the wire to it as shown (side view) in dotted lines. Slip the other end through the nose plug and bend a hook on it.

Covering the Model

The color of the large ship is all blue with white lettering, although on the model it can be any color desired.

In covering the model, it is best to have the grain of the paper running lengthwise. Lay all the parts on the Japanese tissue sheet and trace with a colored pencil around the border of each part to be covered. After all the parts have been traced, cut them out and start covering. When the covering has been done, spray it lightly with water and allow it to dry. This shrinks the paper, giving a smooth, even covering. Then dope it with a light coat of banana oil.

Assembling

To assemble the model, slip the front spar of the wing in the opening between bulkheads No. 2-A and No. 3. After

(Continued on page 48)

A Fine Flyer That's Easily Made

(Continued from page 10)

bly consists of a 1/8x1/8" balsa strip cut to length. The three parts are cemented together and when dry are cemented in place on the wing. Whereas this is a simple-to-make wing mounting structure, it is very rugged and when slipped on the motor stick, will accurately set the wing at the proper angle of incidence.

Tail Unit

The fin is made of 1/32" lightweight sheet balsa and is cemented onto the left side of the motor stick as shown.

The stabilizer is made in the same general manner as described for the wing. The front and trailing edge spars are sanded to the shape similar to the wing. Cover it on top with tissue. In the exact center on top of each spar, trim off a small square of tissue where the spar will be cemented to the underside of the motor stick. To cement the two together, lay the stabilizer flat on the drawing board. The motor stick is then put in its proper place and held there by weights until the cement is dry. Apply several coats.

Miscellaneous

The "Can" is made of soft wire, about .020" size and the circular part is ¼" in diameter. The hook "K" for holding the wing anchor band is of the same material. However, music wire could be used in either case but is harder to work.

The landing gear is made of a straight length of .028" music wire. Put the wheels on and bend the wire at right angles to form a hub cap, see figures 1 and 9. Now put in the bamboo spreader bar, cement and bind with thread. Use thread and cement in securing the landing gear to the motor stick. Attach the thrust bearing with thread and cement.

A 7" machine-cut balsa propeller is advised as a little sanding will prepare it for use and it can be bought for a small sum from any of the supply houses. However, anyone desiring to carve the propeller from a block may do so. If so, use a block 9/16x1x7" cut to the "X" type of blank.

A propeller shaft can be used for the rear hook "H" or one can be bent from .028" music wire. A tiny hole is made straight through the motor stick, 2⅛" from the rear end and the straight part of the wire hook is inserted. It is then bent straight back along the stick and cut off; see fig. 9. Also note that the motor stick is tapered from where the stabilizer begins to 1/16" wide at the rear tip (1/16" in a length of 2⅛"; it is tapered on one side only).

The wing is anchored by means of a small rubber band. This is done by looping the band around the motor stick just ahead of the wing. It is then stretched rearwardly under the wing and hooked on each side of the wire part "K."

Three loops (6 strands) of 1/16x1/30" rubber thread are needed for the motive power. The rubber is looped around the prop shaft and rear hook and the ends tied together at the rear.

When the model is entirely assembled, try gliding it. Move the wing forward if it tends to dive and backward if it noses up, until the best glide is obtained. The technique of pre-flight test gliding a model is: release the plane in its natural gliding angle and at approximately its gliding speed, with the wing tips laterally level. Thus it will start on its glide with balance rather than in an unbalanced attitude. You should acquire this skill with a little practice. Select as calm weather as possible.

Now wind the motor up for a test flight. If it does not fly correctly, recheck and readjust it. Correct any error which you have made. If you have done a careful job, you will probably experience little or no difficulty in flying it, even though just having begun the "game."

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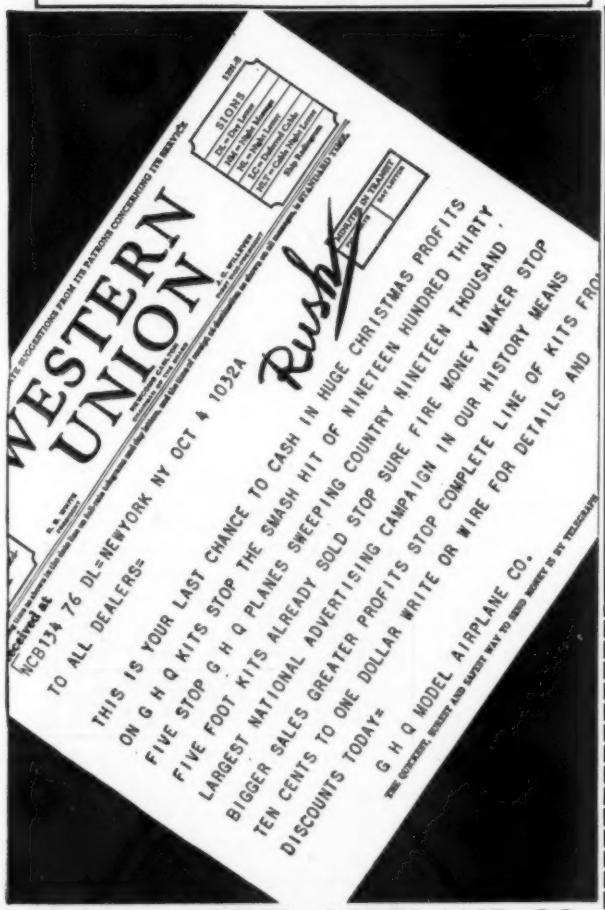

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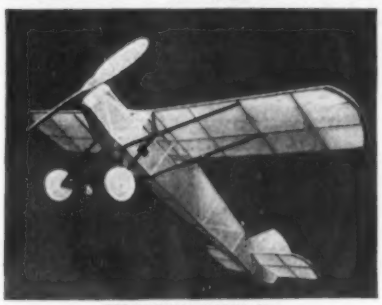

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Highlights of Progress in Indoor Design

(Continued from page 9)

In 1929 Joseph Culver won the Stout indoor trophy with a model that did not resemble any of his predecessors. His wing had a curved dihedral and was very stable. Culver claimed that the performance shown by this wing was good enough to compensate for the loss of lift due to the large amount of dihedral. The motor stick of Culver's model was built up as usual, and the elevator was kite-shaped but was more effective for the reason that it was set back farther from the center of gravity of his model.

The year 1930 might be termed the first transition period in the development of indoor model airplane design, for it was in this year that a number of radical changes were made. All lifting surfaces were lightened through the use of superfine tissue, verithin tissue and aluminum leaf. The wings of many of the models were mounted above the fuselage and greater stability was thus effected. By placing the rubber motor below the motor stick, a lower center of gravity was secured. Longitudinal stability was further increased by mounting the elevator away from the center of gravity on a boom. Both hollow and solid booms were used, but the former were to be preferred because of their greater rigidity and lighter weight. The use of a tail boom in combination with a large area elevator was responsible for the abandonment of the inverse camber design. A variety of propeller shapes was also exhibited. Some builders including Ray Thompson and Fay Stroud, used blades with rounded tips, while others used long, elliptically shaped blades. Albert Mott and Ernest McCoy used propellers with most of the blade area concentrated near the center of the blade. Such props were known as "butter paddles" and turned over very slowly. Ray Thompson's prop was swept back, but it is doubtful whether this had any helpful effect on the performance of his model. What reason he had for this design is not known to the author.

The durations attained at this time were made with ships having wing areas of from seventy to one hundred square inches. The rules for the tractor event specified only that the distance between the thrust bearing and the rear hook be fifteen inches. Obviously the one using the largest wing area in combination with a low wing loading had the advantage—at least present-day records for the various classes of wing areas seem to indicate this. Before the rules were standardized, records were broken with regularity, and probably because larger wing areas were employed. Even since this standardization of rules by the N.A.A. took place, indoor records have been bettered each year, but this is due only to the development of better designs.

During the year of 1931 a number of excellent indoor flights were made, but there was no indoor event held that year at the Nationals in Dayton, Ohio, as there was no arena in that city large enough for the purpose intended.

Just about this time, an article by Jerome Kittel of Englewood, N.J., appeared in MODEL AIRPLANE NEWS. This article served to announce a new covering for indoor models—microfilm. Kittel appeared at a number of local indoor meets with a tractor whose wing and tail surfaces were covered with this new material. He claimed that the ship had done over ten minutes, but he also expressed doubt that microfilm was practical. At Atlantic City, the scene of the 1932 national meet, three microfilm-covered models, one of which belonged to the author, were entered. Neither of the three models placed high up in the list of the winners, but nevertheless these models did stir up a considerable amount of interest among those builders who were present at the contest.

Indoor model builders spent much of their time for the rest of the year in experimenting with this new covering, but only a few builders showed up at indoor meets with microfilm-covered models. It remained for Herbert Owen of New Britain, Conn., to make model airplane history when he broke the existing R.O.G. record of some five and one-half minutes with a flight of 7:29 minutes. Needless to say, everybody built microfilm ships after that. In fact paper-covered models were as rare as the proverbial day in June.

When the national contest was held in 1933 in New York City, very few paper-covered ships were entered—the builders

knew that they would thus be seriously handicapped. This year 1931-1932 might be called the second transition period, for it was due to the advent of microfilm that the indoor tractor record of 13:13 minutes, which was held by Joseph Kovel of Brooklyn, N.Y., was broken twelve times. John Bartol won the meet with an unheard-of time of 17 minutes, 47 seconds. Carl Goldberg of New York pepped up the meet a little by making an unofficial flight of 19:34 minutes.

The depression hasn't seemed to affect the progress of model plane building to any great extent, for records are being broken with increased regularity. During 1932, new marks were made in the R.O.G. and tractor events and also in the indoor commercial event which was added to the indoor program of the national meets. Models came to outwardly resemble each other instead of differing in appearances as they did in 1930. Elliptically-shaped wings and tail surfaces became almost universal. Everybody used hollow sticks and booms and seemed to prefer the teardrop design of Carl Goldberg. Such a stick may be made to weigh less than half as much as the built-up, rectangular cross-section type developed by Aram Abgarian in 1928.

The 1934 National Model Airplane Championships were held in Akron, Ohio, and one of the finest structures for indoor flying was secured. The Goodyear-Zeppelin air-dock is 185 feet high inside—high enough for any record to be made in. The indoor mark, naturally, was raised from 17:47 to 19:04 minutes, and Carl Goldberg again showed his ability by making an all-time world's record of 22:59 minutes. The indoor commercial duration was raised from 8:56 to 13:24 minutes. At this meet were to be seen elliptically-shaped wings containing polyhedral rather than dihedral angle. These wings were mounted off motor sticks at greater distances than ever before. Ships were also lighter and stronger in construction but these were the only noticeable changes from the previous year's typical indoor tractor design. John Young of New York made a noteworthy improvement on the indoor commercial when he braced his fuselage with superfine tissue and covered the sides with microfilm. A class B commercial with a fuselage of

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of MODEL AIRPLANE NEWS published monthly at Mount Morris, Ill., for October 1st, 1935, State of New York, County of New York.

Before me, a Notary Public in and for the State and County aforesaid, personally appeared George C. Johnson, who, having been duly sworn according to law, deposes and says that he is the Publisher of MODEL AIRPLANE NEWS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in Section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

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2. That the owner is: Jay Publishing Corp., 551 Fifth Avenue, New York, N.Y. George C. Johnson, 551 Fifth Avenue, New York, N.Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

George C. Johnson, publisher. Sworn to and subscribed before me this 17th day of September, 1935. Peggy Horowitz. (My commission expires January 15, 1937.)

the same type as Young's and constructed by the author, made a world's record with a flight of 12:23 minutes.

Model airplane history has already been made this year of 1935 for both indoor tractor and indoor commercial records were broken. John Stokes of Huntingdon Valley, Pa., distinguished himself in both events when he placed first and second respectively with flights of 20:53 and 15:05 minutes. Torrey Capo of Boston won the indoor fuselage trophy with a flight of 15:35 minutes. Both Stokes and Capo used paper-braced microfilm-covered commercial fuselages. This national meet was important for the reason that new designs in the way of microfilm propellers were introduced. A model constructed by the author and propelled by a 16-inch microfilm prop made a new world's record of 22:11 minutes in the senior class. This ship had two good flights and each flight surpassed the record mark. A third flight was a bit unfortunate in that it was terminated when the model hit the roof of the 135-foot-high arena and slipped backwards out of control, and then into a dive. The propeller was broken when it hit the hand outstretched to prevent it from hitting the floor. The model would have easily done twenty-four minutes on that flight as it had about 2400 winds and seemed to be flying toward a new all-time world's record. But such is the luck of indoor builders. Carl Goldberg, as usual, came out on top in the open class with an excellent flight of 23:29 minutes.

With the rumor going around that next year's nationals will be held in Akron again, one can only guess at what the new records will be.

The German Air Force in the World War

(Continued from page 13)

known as the "Jagdstaffel Boelcke," in memory of one of their first aces, who organized it in August of 1916.

It was later at various times commanded by Captain Wahl, Lieutenant Bohme, Lieutenant Max Muller, and Lieutenant Carl Bolle. It served on every sector of the Western Front, and ran up a total of three hundred and thirty-six Allied aircraft to its credit as a unit. Its machines were distinguished by their bright yellow bellies. Jagdstaffel Three, which was known as the Loezer Circus, had for its markings, the black and white checkerboard. In March, 1917, Lieutenant Bruno Loerzer assumed command of it, and it operated as a unit, first against the British, the French and then under Captain Bettenge against the American Forces from June, 1918, until the Armistice. Another famous unit was Jagdstaffel Eleven. This was under the command of Baron von Richthofen, until he was promoted to the command of one of the new Jagdschwaders. It was officially known as the Bavarian Blue Tails, but was dubbed by the British, the Tango Circus, for the variety of colors of its airplanes. When the war ended, it had three hundred Allied machines to its credit.

Jagdstaffel Fifteen was probably little known to the Americans, as it fought mainly against the French. It was at one time commanded by Lieutenant Gontermann and in December, 1917, Udet was transferred to it, where it was serving on the Aisne front, opposed to the famous Escadrille N.3, or Storks.

Jagdstaffel Twenty-Six was on the British front, operating mostly in the Arras sector. In January, 1917, Bruno Loerzer was transferred to the command of it, from Staffel Three, and remained with it until he was wounded in action on June 15, 1918.

Jagdstaffel Twenty-Seven was commanded by Goehring, until he also took over one of the Jagdschwaders. Jagdstaffel Thirty-Six, in the latter part of the war, was in command of Lieutenant Bongartz, an ace with thirty-six victories, who was wounded in action on March 3, 1918. Staffel Thirty-Seven, another famous unit, served the bulk of its time in Flanders. Udet was also its commander at one time.

The early months of 1918 provided poor flying weather for all of the belligerents, yet despite this, the Allies brought down close to three hundred German planes. During February, the Allies again downed a similar number. The peak of Germany's aerial strength was at its highest in March of 1918. This month, the British Royal Air Force alone, accounted for three hundred and seventy-two planes destroyed, and another two hundred and five driven down out of control, while for April, the R.A.F., claimed one hundred and seventy-two more destroyed, with seventy-five driven down out of control. The worst blow to the Imperial Air Force occurred on May 1st, when on that one day alone, two hundred and forty-eight German airplanes were destroyed. This marked the turning point in air warfare, but in spite of this, the heroism of its personnel continued at a high pitch until the last days.

The greatest problem faced by their air service, was the replacement of personnel and airplanes during active conditions. Each bad weather period came as a welcomed respite, and was utilized in putting their air units back in fighting trim. Materials for aircraft construction were becoming hard to obtain and many substitutions were reverted to. Younger pilots were more in evidence than previously, most of them being noncommissioned officers. This was

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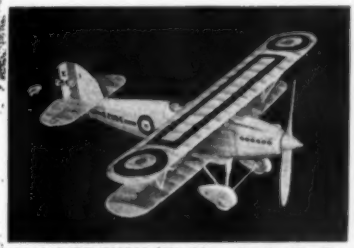

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something new, as heretofore only commissioned officers flew the ships. But, led by the old Staffel leaders, who had between thirty to fifty planes each to their credit, they did their jobs well.

In reviewing the situation towards the last, it may be wondered at the superiority of numbers of German air units over those of the Allies. Although the Royal Air Force had only eighty-six squadrons on the Western Front, these were maintained always at full strength and at top efficiency. This was not exactly so in the case of the French. Their air service, numbering one hundred and three squadrons, were made up mostly of noncommissioned officers, with a few commissioned officers here and there, as flight and squadron commanders. It has been estimated that eighty percent of their pilots were noncoms. The morale of the French was not as high as that in the British and American services in 1918, nor was there the discipline. Besides the forty-five American squadrons in the zone of advance, there were two hundred and eleven equipping in England, besides many other squadrons which were fitting out in the rear of the armies. This allowed the American squadrons to always remain at full strength.

Had the war continued, the Allies would have put large numbers of bombers in France for the proposed spring drive of 1919. The plans of our own forces contemplated the formation of one hundred and one bombing squadrons, made up of sixteen hundred bombardment planes; while those of the British contemplated increasing their air force from eighty-six squadrons, to one hundred and seventy-nine squadrons, of which sixty-six were to be for long distance bombardment. The value of bombardment aviation became more apparent during this time and both sides engaged in long-distance raids. With the new types of heavy bombers produced by the Germans, it is apparent that had the war continued, they would have been utilized in attacks on American landing places at ports of debarkation and concentration camps in the rear areas.

At the time of the Armistice, the Royal Air Force had twenty-eight thousand pilots in service and more than forty thousand airplanes had been constructed. France had built fifty-one thousand airplanes, of which nine thousand five hundred were supplied to the Allies. The United States had constructed thirteen thousand eight hundred and ninety-four airplanes, of which three thousand two hundred and twenty-seven were De Havilland 4s. The balance were mostly training planes, but of the De Havillands produced, one thousand four hundred and forty-three were received in France up to November, 1918, or enough to equip sixty squadrons. In addition, four thousand eight hundred and eighty-six airplanes were purchased from the French for the American Army. With such a preponderance of aircraft and a large reserve of men as pilot material for the Allies, it was evident that no nation could hope to compete against such an aggression.

When the fighting was over, the German air units found themselves in a strange predicament. The other forces were retiring to the rear, and they were left isolated on their airdromes without fuel, food, supplies or orders, and it was with difficulty that any semblance of order or morale was to be had at all. Then came the Armistice terms. These provided for the immediate surrender of approximately one hundred and twenty squadrons, while the remainder of their airplanes were to be destroyed.

All in all, Germany built forty-eight thousand three hundred and six airplanes during the war period. Of these, fourteen thousand and one were destroyed or surrendered, in addition to the three thousand which were left behind in the airdromes when hostilities ceased, and the two thousand six hundred which were turned over to the Allies immediately following the Armistice terms. Germany's loss in airmen amounted to eleven thousand four hundred, which number includes pilots, observers and bombers.

The aircraft production of this period is worthy of mention. In 1914, only one thousand three hundred and forty-eight airplanes were built. These, of course, do not include those on hand at the outbreak of the war. In 1915, four thousand five hundred and thirty-two were constructed. These orders also brought out the first single-seaters for combat fighting, as the contracts included one biplane pursuit of 180 horsepower, and three hundred and forty-seven monoplane single-seaters of 100 to 160 horsepower. Nineteen sixteen saw eight thousand one hundred and seventy-nine new airplanes, with nineteen thousand seven hundren and forty-six in 1917. Fourteen thousand two hundred more were built up to the Armistice.

At the beginning, a system of designation was provided for their airplanes. These letters preceded the type numeral. For instance, the Fokker D-7 was a single-seater, the seventh of that type constructed by Fokker. A glance at the following designations will readily supply the class of any type of airplane. A, was a Taube, pre-war model; B, a two-seater training plane; C, observation two-seater; CL, ground attack two-seater; D, biplane single-seater pursuit; Dr, triplane single-seater pursuit; E, monoplane single-seater pursuit; G, day

(Continued on page 48)

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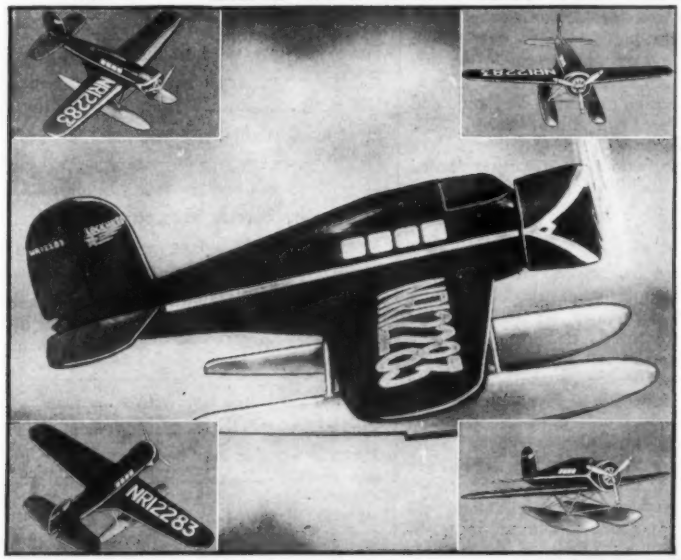

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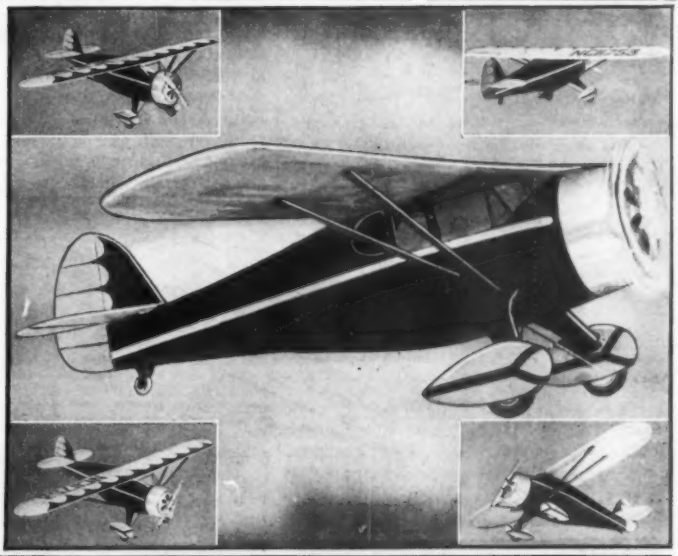

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(Continued from page 8)

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Did it fly?.....

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How many gas models have you built?.....

How many crashes have occurred?.....

Does your model land without crashing usually if it meets no obstruction?.....

Have you ever been injured while operating a gas model?.....If so to what extent? .....

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Has anyone else ever been injured by your gas model?.....If so to what extent? .....

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Has your gas model ever caused damage to property of others?.....If so to what was the extent of the damage?.....

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Do you wish this activity to be abolished?

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What do you think of this activity?.....

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Important Facts of Rubber Power

(Continued from page 21)

cross-section area, or to the number of strands used; that is to $\sqrt{\frac{I}{S}}$ or to $\sqrt{\frac{I}{N}}$

67. The work that can be stored in this type of motor is proportional to the size of the strands (S), the number of strands being the same, or proportional to the number of strands (N), approximately, the size of the strands being constant.

68. The stored work is proportional also to (S), the total cross-sectional area of the rubber in the motor being the same in all cases. This means the larger the strands with any given total rubber cross-section area, the greater the amount of work it is possible to store.

Lubricated Stretched Black Rubber

69. Motors of this character composed of ⅛"x1/32" rubber develop about 22% more maximum torque than motors of lubricated and stretched brown rubber, the motors in each case compared containing the same number of strands.

70. The smaller the size of the strands composing a motor, the less will be the maximum torque of black rubber compared to brown rubber.

71. Use black rubber when a high initial or "take-off" torque is required and the motor is to be composed of large or many strands of rubber.

72. Black rubber gives about 25% less torque than brown rubber after the first initial torque has been spent.

73. The fewer or smaller the strands are, the less is the drop in the torque after the initial impulse compared to brown rubber.

74. For sustained rather than initial torque (power) use brown rubber.

75. Black and brown rubber will absorb about the same number of turns.

76. About 15% more work can be stored in brown rubber than in black when six or more strands are used in a motor.

77. When less than six strands are used black rubber will absorb and deliver about 15% more work than brown rubber.

78. The torque of a motor is proportional approximately to the cross-section area of rubber in a motor, times the square root of the cross section area; i.e., $S\sqrt{S}$, where (S) equals the cross-section area.

79. The number of turns that can be put into a motor is inversely proportional to the square root of the rubber cross-section area, approximately; i.e., to $\sqrt{\frac{I}{S}}$ where (S) equals the rubber cross-section area.

80. The finer the strands used, the greater is the number of turns that can be stored, the cross section area being the same.

81. The larger the strands, the greater is the torque.

82. All other factors being equal, the torque is a measure of the speed and climbing ability of the plane.

83. All other factors being equal, the

number of turns in a motor is a measure of the length of time a propeller will run if the motor is wound completely.

84. All other factors being the same, the work stored in a motor is a measure of the duration of the plane.

(A complete set of formulae for torque, turns, and work for various motors are given in the April, May, June, and July 1935 issues of MODEL AIRPLANE NEWS.)

Application of Power

85. The velocity of rotation of a propeller is proportional to $\sqrt{N}$ or, $V = K\sqrt{N}$.

86. The duration of turning of a propeller when the motor is fully wound is proportional to $\frac{T}{\sqrt{N}}$ or $E = K\frac{T}{\sqrt{N}}$

where (V) represents velocity, (E) represents duration, (T) represents the number of turns when fully wound and (N) represents the number of strands in the motor.

87. Multiple motors give less total duration than single motors as a general rule.

88. Multiple motors give from 10% to 20% greater propeller run but a shorter glide due to the greater weight of the model that ensues from their use.

89. Any multiple motor arrangement in which the motors must be wound in the *same* direction is disadvantageous as the body has to stand the twisting effect of the sum of the torque of both motors.

90. Any multiple motor system in which the motors are wound in opposite directions is the best system to use because the twisting effect of one is balanced by the twisting tendency of the other. In this case the fuselage has to withstand only the pull or tension of the motors.

This summary will be concluded in our next issue.

Blazing Trails at the National Air Races

(Continued from page 7)

ing the smallest plane at the races, made doubly sure of his distinction by having a still smaller ship present this year. It looked like something that was built in his dining room between meals, it was so small. His other little plane, the Tilbury Flash, was a good performer.

While wandering about I came across a small, bright red racer all by itself in another hangar—far from the hum-drum of the other hangar where pilots and mechanics were falling all over each other in hasty fashion. It was all primed up and ready to go. The ship was none other than Marion McKeen's Brown racer, "Miss Los Angeles." Marion McKeen was the dark horse of this year's races, but engine trouble forced him to take it easy around the pylons. He probably got more publicity for having engine trouble than if he had won all the races.

The first day of the Henderson outing, before referred to as the National Air Races, was officially opened with a big bang and a splash soon followed by an announcement in the papers that all events would have to be postponed because of the steady downpour of rain—and more rain. However, the Bendix Race from California to Cleveland took place. Some of the racers were equipped with blind flying instruments; others were not. Instruments or no instruments they all took to the air. Cecil Allen was killed outright. Earl Ortman, one of the favorites, felt his way as far as Kansas City, Mo.; Roy Leonard dropped down in Wichita, Kansas, and Jacqueline Cochran made a speedy trip from the starting line to Arizona, doing another Laura Ingalls. The remaining five contestants swam into Cleveland in fine order.

Well we have learned some good things from this year's Bendix. The five planes that completed the race, Benny Howard's "Mister Mulligan," Roscoe Turner's Wedell-Williams, Russell Thaw's Northrop, Roy Hunt's Orion, and Amelia Earhart's Vega, are much different from the small, wing-fluttering racers and larger steam-boilers that formerly competed in this mad speed dash. Things are getting commercial. Three of the ships are standard stock model commercial jobs with all the necessities for flying in such a race. Benny Howard's ship is able to haul four people through the air with apparent safety, and even that plane is about to give birth to a new sport plane. Turner had the only purely one-man racing plane, and this is the best racing plane in America. Though Roscoe did not have all the blind flying equipment of his four competitors, he has flown the route so much that if he pulled his red and white helmet over his eyes, he could still hit Cleveland right on the nose.

Thaw made the trip nonstop. Three other finishers almost did. Turner alone used the "hedge hopping" method because of his ship's small fuel capacity. Though his plane was the fastest, it did not win the race on account of the small amount of fuel carried. As Benny Howard said, "The only reason Roscoe lost was because he let a photographer take 24 seconds too long in snapping his picture at one of his stop-over ports." You probably know that

Howard beat Turner by only 23½ seconds to win the race. This shows the advantage of having a long-range racer. The London-Melbourne race has also illustrated this point. Even the nonfinishers had long-range characteristics. So in the future we may see all the racers flying the California-Cleveland stretch nonstop (if the Races remain at Cleveland).

Allen and Ortman should never have taken off. About all they had to fly by was their compasses. When you got up in the "soup" that was hovering between California and Cleveland on that memorable day, you wanted to know more than just where the North Pole is located. With these circumstances prevailing, together with a very fast ship that was said by many people to have been built "on a Sunday afternoon," poor Allen had only one chance in a hundred of finishing the Bendix alive. But still they let him go up. A large entry list and a good reliable group of planes on the whole was certainly encouraging this year, though no records of importance were broken. (How could they be with such weather?)

The following three days were full of sunshine and the show took place in fine order. There were parachute jumping, Army and Marine maneuvers, all sorts of noncompos stunting, thrilling air races around four pylons, and all the rest that goes with the Henderson's spectacular air show. Irwin Davis was one of the outstanding 'chute jumpers. Though he risked his life many times at the Races, it was not until a few weeks later, while a mere passenger in an airplane, that his name reached the first page of the newspapers. He was one of the two men that had the free-for-all wrestling match with the late and bemourned baseball player, Len Koenecke, while flying towards New York.

Not satisfied with having American commercial airplanes show up the specially built racing planes in the London-Melbourne race, Major de Seversky had to enter his giant amphibian in the Thompson Trophy Race, the world's greatest annual air classic. Believe it or not it won fifth place out of a field of ten. If this uncontrolled rise to fame of the commercial airplane keeps up we will soon see giant Douglas transports winging their way around the pylons with their 18 passengers waving joyously to the awestricken crowds in the grandstand. What a glorious National Air Race that would be!

The biggest drawback of the air carnival is engine trouble. Nearly every plane had engine trouble during some part of the show as already illustrated by Marion McKeen's and the Delgado's adventures. Roger Don Rae not only had engine trouble but the oil that belched from the engine caught fire, and Rae went whizzing by the grandstands nursing a barnfire up forward.

Tilbury's pocket-size airplane was disqualified from participation because of its minuteness. Evidently the minimum size of a racing plane has been reached. Just what will be the maximum size? Already news comes that there will be a twin-engined plane at next year's National Air Races de luxe.

No one can tell by studying the trend in the design of racing planes in the past few years just what will develop. It is true that a racing plane designer, with an axe in his hand, no longer takes a good look at his new creation and then decides to chop off a couple of feet of the wing to see if it will go faster. They are now applying mathematics to their design, but it is not the accumulation of aerodynamic knowledge that determines the racing planes of the future, it is the question of who is going to pay the expenses. Benny Howard and all the others have original and sound ideas on how to build a plane that could do at least 400 m.p.h., but the main question is as to where is anyone that has $200,000 or more to spend for such planes beside Howard Hughes? All that is left to do is "clean up" on the present job and put a new smoother paint job on it. Seldom is a new racer created with a superior performance over its predecessors of just a short while back. Some have been such abortions that there appears to be something radically wrong with its designer. The worrying of where he is going to get the money to pay for his new plane has just about driven him insane.

A CORRECTION

The illustration of the Propeller in the International Model Company advertisement in the November issue was incorrect. The picture illustrated their "Tru-Detail" Heavy Duty Propeller which should have been the "Steel Type" Propeller. This correction is published to clear up any misunderstanding on the part of any reader who received a Propeller different from that shown in the advertisement.

Airways—Here and There

(Continued from page 23)

enough for planes, so I spend my spare time with models and with MODEL AIRPLANE NEWS. Both of them are a great joy, and help spend a lot of lonely hours until my return to the States."

To prove his interest Mr. Weygint sends us picture No. 6, of the scale Boeing P26-A, which he has just completed. It is built up in considerable detail and required 100 hours to complete. The wingspread is twenty-one inches and it is seventeen inches long. The motor is made of approximately 125 separate parts. Mr. Weygint says this is his first built-up job.

An unusual commercial contest model is shown in picture No. 7. It was built by Walter Faryn of 437 East Fifth St., New York City. Considerable attention has been paid to streamlining and details. The landing struts are neatly made and the fin and stabilizer are carefully streamlined into the body. Stability is obtained by the use of a polyhedral wing, the wing tips being turned up and swept back slightly. Mr. Faryn does not tell us what results he has had with this ship. We would be interested to hear from him.

MODEL NEWS FROM OTHER COUNTRIES

England

It appears that American models have not only captured the attention of English builders through the winning of the Wakefield Trophy by Gordon S. Light, but American gliders have also made their appearance in the British ranks. Mr. J. P. Penny of 83 Coldharbour Road, Redland, Bristol, England, writes us telling of the excellent performance which he obtained with a Robert File glider, which he built from plans in MODEL AIRPLANE NEWS. Mr. Penny is shown with this ship in picture No. 8. He says this glider also was very successful. On one of its flights it was lost to sight after eight and a half minutes. Later it was found three and a half miles away. The ship came to an untimely end when it landed in the top of a 60-foot tree on a subsequent flight. It remained in the tree for twelve days, when the body and wings parted company. Both parts of the machine were retrieved. Mr. Penny was surprised that neither the fuselage nor the wings were damaged, except for a slight rip in the paper; even though the wind and rain had wreaked their vengeance upon it for ten days. An interesting note at the bottom of his letter is as follows:

"I may add that I built an all-balsa model airplane last year with a 6-foot span, which had a flight of forty-five minutes."

Australia

Gas model building has taken Australia by storm. Mr. Freshman, of the Model Flying Club of Australia, is encouraging this activity intensively. Recently a ship which Jack Finneran built made a flight of fifteen minutes and obtained an altitude of 700 feet. This was the longest flight made up to that time.

However, young men in Australia are taking up this activity, as may be seen in picture No. 9, which shows John Duffecy with the completed framework of Joe Kovel's model, which he has built from plans in MODEL AIRPLANE NEWS.

Japan

Mr. Hiroyasu Minowa of No. 3 Wakamatsucho, Ushigome-Ku, Tokyo, Japan, sends us picture No. 10 of the junior members of the famous Nishiki Model Club of which he is the guiding spirit. This picture was taken at one of the competitions which are held frequently in Tokyo. It is interesting to note that not only the older young men in Japan are interested in this sport, but the younger group are also, some of whom cannot be over nine or ten years old, judging from the picture.

Russia

Picture No. 11 indicates the interest which is shown in model building in Russia. Here you see several Soviet school chil-

dren with the model planes they have constructed. Model aviation is a compulsory subject in the schools of Russia because they realize the value of this sport in training young men in aviation, as well as in the manual arts. Thus, the principles of flight are instilled into the Russian children at an early date. Therefore thinking along aeronautic lines becomes instinctive.

CLUB NEWS

California

One of the most important events to take place each year is the California State Champion Model Airplane Contest held at the California State Fair. It was held on September 1st and 2nd at Sacramento. The director of the contest was Waldemar E. Doyal, Science Instructor in the Sacramento High School. He was assisted by Mr. Hilton F. Lusk, Chairman of the Technical Department. An interesting array of events were held. They were as follows: All-Balsa Hand-Launched Glider, Stick Model, Fuselage Model Flying Scale Model, Racing Model, Novelty Flying, Compressed Air Powered Model, Gasoline Engine Powered Model, Exhibition Scale Model.

Picture No. 12 shows Louis Schocke and trophies he won at this contest. He won the Fuselage and Flying Scale Events. The three little cups appearing in the picture were won for defending in 1935 the events that he won in 1934; namely, Fuselage, Flying Scale and Speed.

Incidentally, the winning of the Flying Scale Event for two years in succession brought Schocke an $800 scholarship at the Boeing School of Aeronautics, at Oakland.

Picture No. 13 shows Bill Atwood of Glendale, winner of the Gas Event, and his little ship. Atwood not only built the ship, but also designed and built his engine. He is an engineer with the Douglas Airplane Company. Atwood was 1934 California Gas Model Champion.

Newark, New Jersey

One of the important events that took place in the East recently was the Third Model Airplane Builders' Convention, held at L. Bamberger & Company, Newark, on September 14th. This convention may have a far-reaching effect, inasmuch as policies, rules, and future procedures in all model aviation work were discussed. It was attended by most of the men prominent in model aviation and by the foremost model builders.

One of the main points of note was the suggestion that gas model contests be discontinued. The gas model cause was immediately championed and a discussion ensued which may continue for several months. (We suggest that you read the editorial on page 6). The general feeling among those who attended the convention was that they need not take this threat to gas model flying too seriously.

Among other features that were discussed was the advisability of increasing wing loading on models in order to restrain their flights within reasonable limits. The whole atmosphere of the convention was air-minded to a high degree. This appeared to be catching, for when the dessert appeared the ice cream arrived on the plates in the form of an airplane. We do not doubt that frozen airplanes is a new delicacy of which many model builders have not partaken.

We wish to praise Mr. Nathan Polk, who is the director of the Bamberger Aerio Club, for organizing and carrying out the program in an efficient manner.

Tailspins is the official organ of the club and is edited by Philip Zecchitella. In a recent issue it gives a very realistic account of the remarks and findings of the convention. Picture No. 14 shows a group of model builders who attended the convention, with Joe Kovel holding the world's record gas model which was lost recently near Hadley Field, N.J. Notify us if found. Left to right, they are: Leo Weiss, 1935 Texaco Trophy winner, Maxwell Bassett, twice Texaco Trophy winner, Joe Kovel, present world's record holder, Gordon Light, Wakefield winner, William Wert, Phila. Junior Champion, and Charles Heintz, Philadelphia Senior Champion.

Ohio

Mr. Albert W. Barkdull of Shelby, Ohio, is kind enough to send us an account of the North Central Ohio Model Air Meet, held at the Mansfield Airport, Sunday, August 25th. Mr. Barkdull was director of the contest.

"A highlight of the meet was the performance of the 16-foot model Bowlus Sailplane, shown in picture No. 15. All the flyers stopped to watch the slow, smooth,

graceful flights of this beautifully built model. It is believed that a new national record was set by this model, which placed second in the free-for-all towline launched glider contest.

"The following are the results of the competition. No age restrictions were imposed:

Outdoor Stick Event

Bruce Smith, Dayton.....1 min., 59 sec.
James Neff, Dayton.....1 min., 38 sec.
Robert Rice, Findlay.....1 min., 10 sec.

Hand-Launched All-Balsa Glider Event

Dale Koozer, Mansfield.....38 min., 5 sec.
Harold Crepps, Mansfield....25 min., 5 sec.
Dick Bishop, Findlay.....25 min.,

Outdoor Fuselage Event

Jack Smith, Dayton.....21 min., 10 sec.
James Neff, Dayton..... 9 min.,
Robert Rice, Findlay..... 2 min., 34 sec.

Towline Launched Glider Event

James Neff, Dayton.....1 min., 31.8 sec.
Jack Smith, Dayton.....1 min., 23.4 sec.
Dale Koozer, Mansfield....1 min., 5 sec.

Highspire, Pennsylvania

During this past summer, the United States Defensive Corps held a contest on May 1, 2, 3, and 4, 1935. We regret this event escaped our attention until the present time. The winners are as follows:

Class A—Flying Scale Models—David Barry with 90 points and Fred Knight, Jr. with 75.

Class B—Solid Scale Models—David Barry with 80 points and James Walmer with 79. Bliss Barry and Fred Knight, Jr., both tied for third place with 71 points each.

We are indebted for this information to Fred Knight, Jr., Secretary of the Corps.

New Orleans, Louisiana

Under the auspices of the local Y.M.C.A., several New Orleans boys have organized the New Orleans Model Airplane Club. At present there are sixteen members enrolled. Meetings are held twice a month, on the first and third Saturdays at 2 o'clock. Requirement for membership is the ability to secure a duration of sixty seconds. The officers are: Landry Murphy, President; Sidney Murphy, Vice-President; and David Markstein, Secretary. Mr. Bulger of the Y.M.C.A. is the director and treasurer. Informal contests are held on the second Sunday of each month. A big "free-for-all" contest was held September 8th. Model builders from all over the city, members and nonmembers, were invited to compete.

Brooklyn, New York

There is a live little club in Brooklyn under the name of the Challenge-Airs Model Aero Club, the Commander of which is Joseph R. Carbonell of 87 Ross St., Brooklyn, New York. In one of the last contests they held, the high-point winner, Robert Keegan, made a 6 min., 2/5 se. flight in the glider event. Joseph Hofman, third place winner, made 10 min., 28 2/5 sec. in the cabin event and Ira Klein made 5 min., 40 sec. in the stick event. Second place winner was Ed Johnson with average time of 2½ minutes.

Boston, Massachusetts

From editor Lewis of *Wing Overs*, the official organ of the Jordan-Marsh-Boston Traveler Junior Aviation League, comes news of J.A.L. members. One of the outstanding incidents is the entrance of George Zeitlen and Hewitt Phillips into the portals of Massachusetts Institute of Technology. They are old model builders and have laid plans to augment their technical inclinations by studying at this excellent aeronautic engineering school.

The first indoor meet was held October 5th. The usual type of events took place. As yet no information has been received concerning the results of the contest. An active winter program is expected.

The German Air Force In the World War

(Continued from page 40)

bomber; J, armored plane; N, night bomber; S, ground fighter—also similar to CLs, but with increased horsepower—only two of these were constructed late in 1918; R, giant bombers; and V, for seaplanes.

From the start it is apparent that the Germans had a clearer comprehension of the value of their air force. The first bombing incidentally was done by Immelman, who on August 30th, 1914, after releasing a shower of small bombs on Paris, dropped a note asking for the surrender of the city, as the German troops at that time were practically at the very gates. The first fixed synchronized machine-guns on the front were mounted in German planes, while the credit for the first ship of the war shot down in combat goes to the French air service.

Until the middle of 1917, they had dominated the Western Front, and always on the Eastern Front had maintained a superiority at all times over the Russians. When Russia broke down, the air units were at once dispatched to the Western Front, proving a strong reinforcement. The construction and utilization of special types evinced the wisdom of this plan. The havoc wrought by the CL-type of specially constructed ground attack airplanes during the 1917-1918 campaign is history, at which time the Allies were using pursuit and reconnaissance machines for such missions.

Probably no finer tribute has ever been paid any hostile army than that which has been paid the German Air Force by those Allied airmen who opposed it. Its spirit of aggressiveness and the sportsmanship of its pilots made it a worthy foe, and it was the only branch of the German Army that did not desert its colors when revolt and dissension swept the land, which resulted in the Armistice.

Build and Fly this Famous Racer

(Continued from page 31)

the spar has been slipped into place, the remaining opening can be filled with balsa or covered with paper. Cut 2 slots in the tail block to insert the front and rear spars of the elevator and cement it in place. Cement the rudder in place and allow to dry.

Now fasten the windscreen in place.

The power plant consists of 8 strands of ⅛" flat rubber for highspeed flights, or 6 strands for slow flights.

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Douglas Observation New army plane—wonderful flyer due to parasol wings.

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Wonderful new models made by Megow. Beautiful flyers, that make any model builder thrill with pride. Big 30-inch planes so accurately designed and planned that building and flying them is a real pleasure.

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"The best way I know of really having it is—with Cleveland-Designed models. Honestly, they're the most realistic flying models I've ever seen, and you know your ol' friend Santa's been around everywhere. Fact is, they're so good that we've stopped making model airplanes at North Pole headquarters—and just send our business to Cleveland—those people are experts at it. Well, it won't be long now, and I hope my list includes some of these wonderful C-D's for you. Better get busy right away!"

U. S. NAVY CURTISS F9C-2

Easy to build—and beautiful flyer. Drawings include also full information for making original 1931 Akron Fighter. Span 19", length 14⅝", weight 2.2 oz. Silver, blue, red, black details. Kit SF-22B..... **$2.50**

DH-4 BATTLE PLANE
Amazingly authentic. Span 31⅜", length 22¼", weight 3.9 oz. Now olive drab with black and white checkered nose and fin, white wheels. Kit SF-3..... **$3.50**

BISHOP'S NIEUPORT
Pride of Canada's war ace, who assisted in our redesigning work. Span 19⅝", length 14", weight 1.8 oz. Silver and blue. Kit SF-12B..... **$2.50**

SOPWITH CAMEL
Span 20⅜", length 14½", weight 1.8 oz. Snappy cream and brown fuselage, parts of wings and tail. Fuselage sides cream and brown checkered. Kit SF-10..... **$2.50**

RICKENBACKER'S SPAD XIII
Very authentically redesigned. Span 19", length 15⅝", weight 2.5 oz. Yellow, green, black details. Kit SF-13B..... **$2.65**

CURTISS JN4-D
The wartime trainer. Span 32⅜", length 20⅜". Weight 2.7 oz. Now a beautiful yellow with brown trim and aileron decoration. Kit SF-4..... **$3.25**

POLISH P-6 FIGHTER
A real beauty—with "filled-in" fuselage, etc. Span 25⅛", length 17½", weight 2.5 oz. All silver. Kit SF-6..... **$2.95**

SOPWITH SE-5
Large beginner model. Excellent flyer. Span 20", length 15¾", weight 1.9 oz. Natural cream color. Kit SF-9..... **$1.25**

FOKKER D-8
Claimed most efficient German World War fighter. Span 20¾", length 14½", weight 2.9 oz. Cream and blue. Kit SF-34..... **$2.50**

REDESIGNED LAIRD SUPER-SOLUTION
Our famous high-speed flyer. More authentic than ever. Span 15½", length 13¼", weight 1.7 oz. Yellow and green. Kit SF-5B..... **$2.50**

NIEUPORT 28
Called most beautiful World War model and it certainly is. A beauty for flights, too. Span 20⅜", length 16½", weight 2.1 oz. All silver. Kit. SF-30..... **$2.50**

CURTISS A-8 ATTACK
Superdetailed. Extremely realistic. A real performer. Span 33", length 24", weight 4.7 oz. Colored yellow and olive drab. Kit SF-25..... **$3.25**

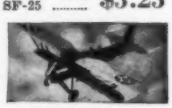
CAPT. PAGE'S RACER
High speed model. Span 23⅝", length 17⅝", weight 3.5 oz. Silver with red, white and blue insignia. Kit SF-44..... **$2.65**

CURTISS HELLDIVER
Data for both Executive or Fighter types. Authentic ribs, etc. Span 23⅞", length 16⅛", weight 2.7 oz. Blue and silver. Kit SF-7B..... **$3.50**

ALBATROS D-5
Greatly improved. "filled in" fuselage, etc. Span 22", length 17⅜", weight 2.3 oz. Dazzling coloring of yellow, orange, black. Zig-zag fuselage stripe. Kit SF-16..... **$2.50**

HALL RACER
Speed flights. Span 19½", length 13⅝", weight 2.8 oz. Red with beautiful black scalloping—nothing else ever like it. Kit SF-31. **$2.75**

BUHL BULL PUP
Popular lightplane. Excellent for flights, quite easy to build. Span 22⅝", length 15", weight 1.9 oz. Yellow and blue. Kit SF-38..... **$1.75**



BERLINER-JOYCE
Graceful-appearing 2-place fighter. Excellent flights. Span 25⅛", length 21", weight 3.9 oz. Yellow and olive drab. Kit SF-39..... **$3.50**

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A real beauty. Span 23⅝" length 16⅝". All silver except red cowl and tail. Kit SF50..... **$3.75**

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